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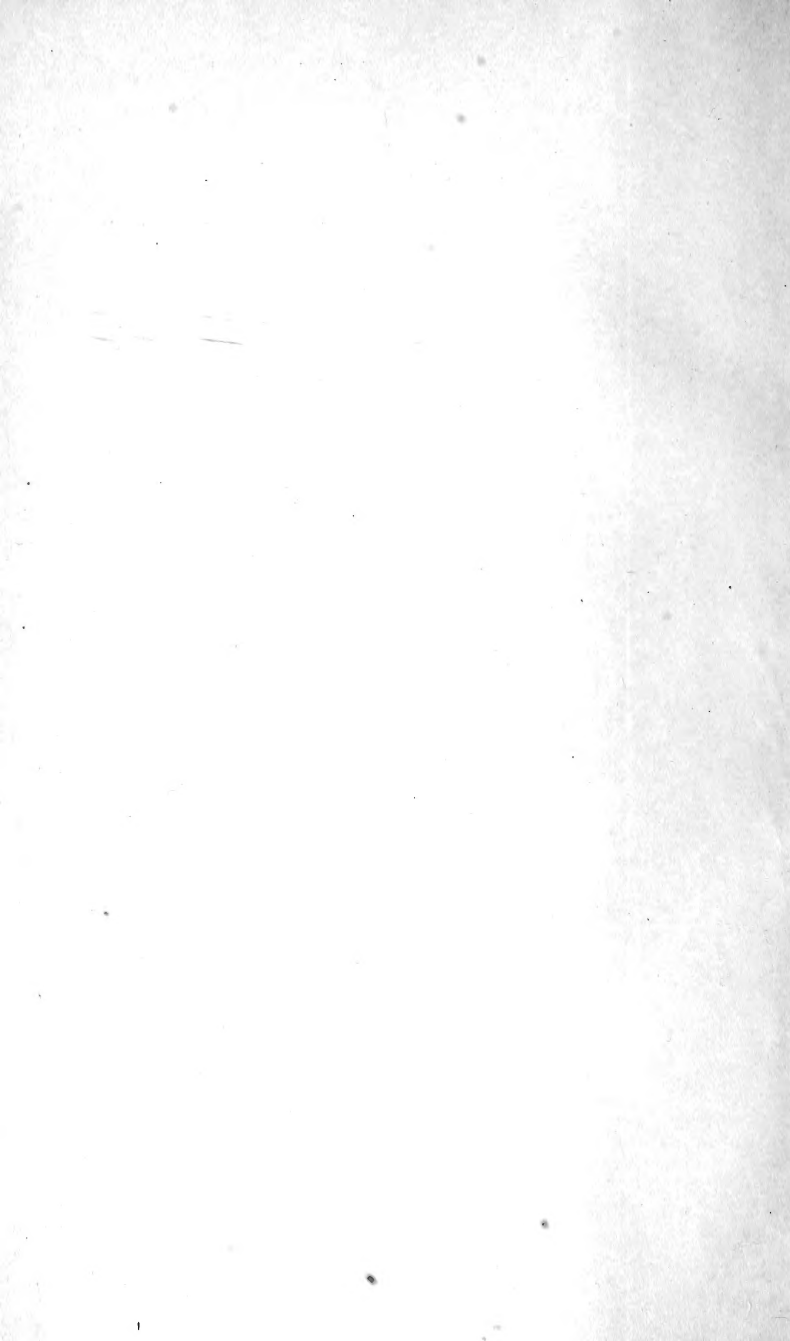
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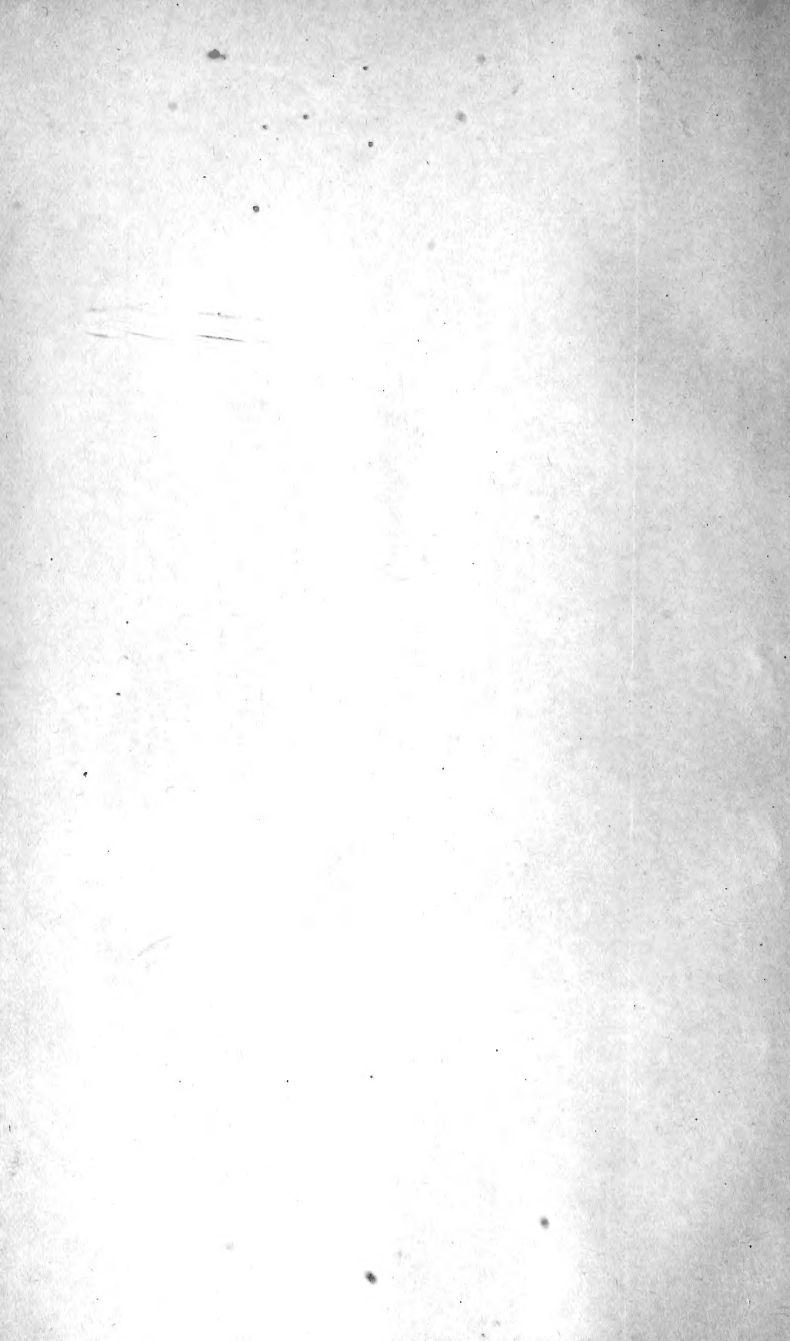
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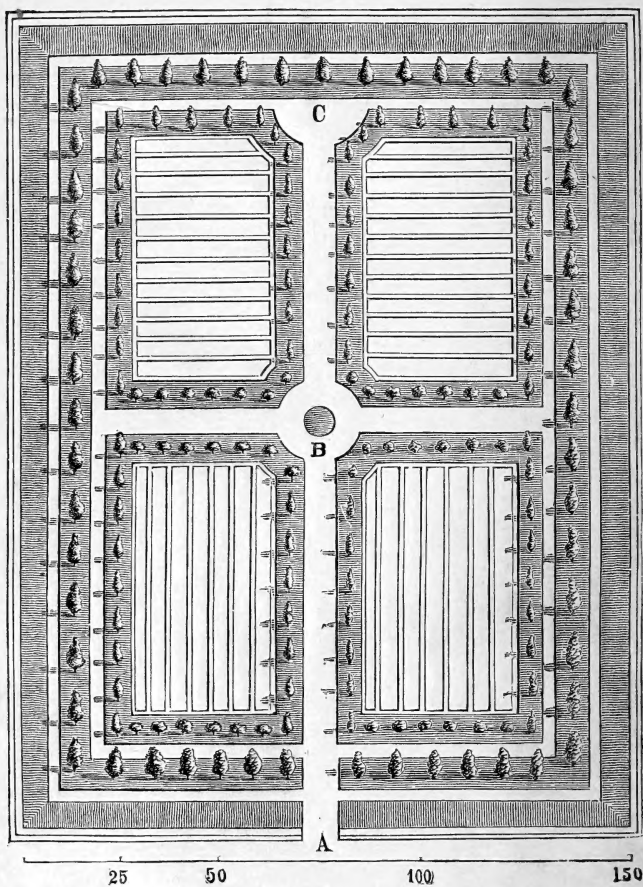
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FRONTISPIECE.

PLAN OF A FRUIT GARDEN.

BARRY'S
FRUIT GARDEN.



BY
P. BARRY.

REVISED, ENLARGED, AND NEWLY ELECTROTYPED.

ILLUSTRATED.

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INTRODUCTION TO FIRST EDITION.

The subject of this treatise is one in which almost all classes of the community are more or less practically engaged and interested. Agriculture is pursued by one class, and commerce by another; the mechanic arts, fine arts, and learned professions by others; but fruit culture, to a greater or less extent, by *all*.

It is the desire of every man, whatever may be his pursuit or condition in life, whether he live in town or country, to enjoy fine fruits, to provide them for his family, and, if possible, to cultivate the trees in his own garden with his own hands. The agriculturist, whatever be the extent or condition of his grounds, considers an *orchard*, at least, indispensable. The merchant or professional man who has, by half a lifetime of drudgery in town, secured a fortune or a competency that enables him to retire to a country or suburban villa, looks forward to his fruit garden as one of the chief sources of those rural comforts and pleasures he so long and so earnestly labored and hoped for. The artizan who has laid up enough from his earnings to purchase a homestead, considers the planting of his fruit-trees as one of the first and most important steps towards improvement. He anticipates the pleasure of tending them in his spare hours, of watching their growth and progress to maturity, and of gathering their ripe and delicious fruits, and placing them before his family and friends as the valued products of his own garden, and of his own skill and labor. Fortunately, in the

United States, land is so easily obtained as to be within the reach of every industrious man ; and the climate and soil being so favorable to the production of fruit, Americans, if they be not already, must become truly "a nation of fruit growers."

Fruit culture, therefore, whether considered as a branch of profitable industry, or as exercising a most beneficial influence upon the health, habits, and tastes of the people, becomes a great national interest, and whatever may assist in making it better understood, and more interesting, and better adapted to the various wants, tastes, and circumstances of the community, cannot fail to subserve the public good.

Within a few years past it has received an unusual degree of attention. Plantations of all sorts, orchards, gardens, and nurseries, have increased in numbers and extent to a degree quite unprecedented ; not in one section or locality, but from the extreme north to the southern limits of the fruit-growing region. Foreign supplies of trees have been required to meet the suddenly and greatly increased demand. Treatises and periodicals devoted to the subject have increased rapidly and circulated widely. Horticultural societies have been organized in all parts ; while exhibitions, and national, State, and local conventions of fruit growers, have been held to discuss the merits of fruits and other kindred topics.

To those unacquainted with the previous condition of fruit culture in the interior of the country, this new, planting spirit has appeared as a sort of speculative mania ; and the idea has suggested itself to them that the country will soon be overstocked with fruits. This is a greatly mistaken apprehension. After all that has been done, let us look at the actual condition of fruit culture at the present time. In the best fruit-growing counties in the State of New York, the entire fruit plantations, of more than three-fourths of the agricultural population, consist of very

ordinary orchards of apples. Not a dish of fine pears, plums, cherries, apricots, grapes, nor raspberries, has ever appeared on their tables, and not a step has yet been taken to produce them. People are but beginning to learn the uses of fruits, and to appreciate their importance.

At one time apples were grown chiefly for cider; now they are considered an indispensable article of food. The finer fruits, that were formerly considered as luxuries only for the tables of the wealthy, are beginning to take their place among the ordinary supplies of every man's table; and this taste must grow from year to year, with an increased supply. Those who consume a bushel of fruit this year, will require double or treble that quantity next. The rapid increase of population alone, creates a demand to an extent that few people are aware of. The city of Rochester has added 20,000 to her numbers in ten years. Let such an increase as this in all our cities, towns, and villages, be estimated, and see what an aggregate, annual amount of new consumers it presents.

New markets are continually presenting themselves, and demanding large supplies. New and more perfect modes of packing and shipping fruits, and of drying, preserving, and preparing them for various purposes to which they have not hitherto been appropriated, are beginning to enlist attention and inquiry.

Immense amounts of money are annually expended in importing grapes, wines, figs, nuts, prunes, raisins, currants, almonds, etc., many of which might be produced perfectly well on our own soil. Pears have actually been imported from France by the New York confectioners, this present season (1851). These are facts that should be well understood by proprietors of lands, and especially by those who have allowed themselves to imagine that fruit will soon be so plenty as not to be worth the growing.

It is too soon, by a century, to apprehend an over sup-

ply of fruits in the United States, except of some very perishable sort, in a season of unusual abundance, in some particular locality, where one branch of culture is mainly carried on.

It is because fruit culture has been almost entirely neglected until within a few years, that the present activity appears so extraordinary. A vast majority of the people were quite unaware of the treasures within their reach; and that in regard to soil and climate, they possessed advantages for fruit growing superior to any other nation. We had no popular works or periodicals to diffuse information or awaken interest on the subject. For fourteen or fifteen years Hovey's *Magazine of Horticulture* was the only journal exclusively devoted to gardening subjects, and it only found its way into the hands of the more advanced cultivators. We had some treatises on fruits, but none of them circulated sufficiently to effect much good. Previous to 1845, *Kenrick's American Orchardist*, and *Manning's Book of Fruits*, were the principal treatises that had any circulation worth naming. Coxe's work, Floy's, Prince's, and some others, were confined almost wholly to nurserymen, or persons already engaged and interested in fruit culture in the older parts of the country.

Mr. Downing's "Fruit and Fruit Trees of America," that appeared in 1845, was the first treatise of the kind that really obtained a wide and general circulation.

It made its appearance at a favorable moment, just as the planting spirit referred to was beginning to manifest itself, and when, more than at any previous period, such a work was needed. Mr. Downing enjoyed great advantages over any previous American writer. During the ten years that had elapsed since the publication of Kenrick's and Prince's treatises, a great fund of materials had been accumulating. Messrs. Manning, Kenrick, Prince, Wilder, and many others, had been industriously collecting fruits both at home and abroad. The Massachusetts

Horticultural Society was actively engaged in its labors. The London Horticultural Society had made great advancement in its examination and trial of fruits, and had corrected a multitude of long standing errors in nomenclature.

Mr. Downing's work had the benefit of all this; and possessing the instructive feature of outline figures of fruits, and being written in a very agreeable and attractive style, it possessed the elements of popularity and usefulness in an eminent degree. Hence it became at once the text-book of every man who sought for pomological information, or felt interested in fruits or fruit-trees; and to it is justly attributable much of the taste and spirit on the subject, and the increased attention to nomenclature, that so distinguishes the present time. Mr. Thomas's recent treatise, "The American Fruit Culturist," on the same plan as Mr. Downing's, is also a popular work, and will be the means of diffusing both taste and information. Mr. Thomas is a close and accurate observer, and his descriptions are peculiarly concise, methodical, and minute. "Cole's Fruit Book" is also a recent treatise, and on account of its cheapness, and the vast accumulation of facts and information it contains, is highly popular and useful. Besides these, periodicals, devoted more or less to the subject, have increased in number, and greatly extended their circulation, so that information is now accessible to all who desire it.

The light which has been shed upon fruit-growing by these works, and the taste they have created, have not only improved old systems of cultivation, but introduced *new* ones. Until within a few years, nothing was said or known among the great body of cultivators, or even nurserymen, of dwarfing trees, of the uses of certain stocks, or of modes of propagation and pruning by which trees are made to bear early, and are adapted to different circumstances. The entire routine of the propagation and

management of trees was conducted generally in the simplest and rudest manner. Whether for the garden or the orchard, they were propagated in the same manner, on the same stocks, and in the same form taken from the nursery, planted out, and left there to assume such forms as nature or accident might impose, and produce fruit at such a time as natural circumstances would admit.

The art of planting fifty trees on a quarter of an acre of ground, and bringing them into a fruitful state in four or five years at most, was entirely unknown. Small gardens were encumbered with tall, unshapely, and unfruitful trees, that afforded no pleasure to the cultivator; and thousands of persons, who are now the most enthusiastic cultivators, were entirely discouraged from the attempt.

Fruit gardening, properly speaking, may be said to have only commenced. It is no longer a matter of mere utility, but taste also; and, therefore, *adaptation*, *variety*, and *beauty* are sought for in garden trees, and modes of culture and management. Nothing so distinguishes the taste of modern planting as the partiality for dwarf trees, and the desire to obtain information in regard to their propagation and treatment.

This has not been anticipated by any of our authors. The standard or orchard system alone is fully treated of, as being the only one practised; and this requires so little skill in the art of culture, that only the simplest instructions have been given. The very elements of the science have been unexplained and unstudied, and cultivators in the main find themselves both destitute of knowledge in regard to the management of trees in the more refined and artificial forms, and the sources from which to obtain it. But a very small proportion of those engaged or engaging in tree culture have studied the physiology of trees in any degree. Very few have the slightest knowledge of the modes of growth and bearing of the different species of fruits, or even of the difference between wood

or leaf-buds and fruit-buds. Very few understand the functions of the different parts of trees, and the relation in which they stand one to another; the principles that govern and regulate the growth and maturity, the formation of wood, and the production of fruit. *Practice* is no better understood than principle. Persons engaged largely in tree growing will frequently ask the most absurd questions on the subject of propagation of stocks, of pruning, etc., matters that should be understood by every man who has a single tree to manage, but especially indispensable to those who wish to succeed in conducting garden-trees under certain modified forms, more or less opposed to the natural. The preparation of ground, laying out small gardens, the selection of suitable trees, and a multitude of minor, but nevertheless, important matters are very imperfectly understood. Neither our State nor national governments have ever manifested a disposition to favor the rural arts with anything like a liberal patronizing policy. Advanced, wealthy, and powerful as we are, not a single step has been taken, in earnest, to establish model farms or model gardens, in which experiments might be made, and examples given, that would enlighten cultivators, and elevate and honor their profession. Whatever advance has been made, is due wholly to individual taste, energy, and enterprise; and to these alone are we permitted to look for future progress.

Having for many years devoted much attention to this particular branch of culture, and feeling deeply interested in its success, and having, by a business intercourse with cultivators in all parts of the country, an ample opportunity of understanding the nature and extent of the information desired, I have prepared the following pages to supply it, at least, in part.

I am well convinced that the work is neither perfect nor complete. It has been prepared, during a few weeks of

the winter, in the midst of other engagements that rendered it impossible to bestow upon it the necessary care and labor. My original intention was to give a few brief directions for the management of garden-trees, but it was suggested by friends that it would prove more generally useful by adding a sketch of the entire routine of operations, from the propagation in the nursery to the management in the orchard and garden. This has involved much more labor than it was intended to bestow upon it, or than I could really spare from business. It has, therefore, been performed hastily, and, of course, in many respects, imperfectly; but yet it is hoped it contains such an exposition of principles and practices as cannot fail to diffuse amongst the inexperienced much needed information. All doubtful theories, and whatever had not a direct practical bearing on the subjects treated, have been excluded, both for the sake of brevity, and to avoid anything calculated to mislead. The principles and practices set forth are not new, visionary, nor doubtful, but such as are taught and practised by the most accomplished cultivators of the day, and have been successfully carried out in the daily operations of our own establishment.

In the pruning and management of garden-trees, the French arboriculturists surpass all others. Their trees are models that have no equals, and that all the world admire. The English, notwithstanding their great gardening skill, and their refined and elegant modes of culture, are far behind the French in the management of fruit-trees. French systems of pruning and training are at this moment advocated and held up as models by such men as Mr. Robert Thompson, head of the fruit department in the London Horticultural Society's Garden; by Mr. Rivers, well known on this side of the Atlantic as one of the most energetic and accomplished nurserymen in Great Britain, and by many others whose skill and judgment command attention. Their introduction to

English gardens is going on rapidly, and bids fair to revolutionize their whole practice of fruit-tree culture.

D'Albret's great work on pruning is conceded to be the best extant, on that subject. He was the pupil and successor of M. Thouin, the world-renowned, vegetable physiologist and founder of the great national gardens at Paris. His practice is founded upon the true principles of vegetable physiology, and strengthened by long years of the most minute and successful experiment.

M. Dubreuil, late conductor of the fruit department in the Garden of Rouen, has also published an excellent treatise on arboriculture; and there are many other French works on the subject, all showing how thoroughly the science is there understood, and how minutely and skillfully its principles are dealt with. All these, as well as the best managed gardens, and the most perfect and beautiful trees in France and Belgium, have been carefully studied.

The knowledge thus acquired, added to the experience of many years' actual and extensive practice, constitutes the basis of the course recommended.

The same minute detail that characterizes European works has not been attempted, yet much detail is absolutely necessary, in order to prevent misapprehension on the part of those wholly inexperienced.

Writers are apt to treat simple matters too much in the general, presuming them to be well understood. Detail is always tedious to those familiar with the subject, but nothing less can be satisfactory to the student.

For the sake of convenient reference, the different branches of the subject have been separated into four parts. The *first* treats of general principles, a knowledge of the structure, character, and functions of the different parts of trees, modes of growth, bearing, etc., etc.; soils, manures, modes of propagation, etc. This must be the groundwork of the study of tree culture. The *second*

treats of the nursery. The *third* of plantations, orchards of different kinds, gardens, etc.; their laying out and management, and of the pruning and training of trees in different forms. The *fourth* contains abridged descriptions of the best fruits, a chapter on gathering and preserving fruits, another on diseases and insects, and another on the implements in common use.

Illustrations have been introduced wherever the nature of the subject seemed to require them, and it was possible to get them prepared. It is believed that these will prove of great value in imparting a correct knowledge of the various subjects. Upwards of one hundred of the more important figures have been drawn from nature by Professor Sintzenich, of Rochester.

P. B.

Mount Hope Garden and Nurseries, }
ROCHESTER, N. Y. }

PREFACE TO REVISED EDITION.

Twenty years ago the First Edition of this Treatise was published. What marvellous changes have taken place in our country during that period.

Our population has been fully doubled. The Railway has spanned the continent and brought its most remote parts within a few days' pleasant travel of each other. The Telegraph has brought together, as it were, every part of the world.

Territories that then had scarcely a white inhabitant are now populous and productive States.

In this general and extraordinary progress, Fruit Culture seems to have held its own.

In every part of our country, wherever the soil and climate offer the least encouragement, Fruit trees are planted. The fruits of California attract almost as much attention as the products of her mines; yet, twenty years ago, there was scarcely an apple produced in the State, except in some of the old mission gardens.

Societies for the promotion of Fruit Culture are organized everywhere. Books on the subject are multiplied rapidly.

Horticultural periodicals are increasing, and the agricul-

tural journals, now so numerous, all give fruit culture special attention.

We have made important acquisitions in the way of new varieties of fruits, particularly in grapes, and we have gained much valuable experience, both in methods of culture and in regard to the relative merits of varieties under various circumstances of soil, climate, etc., but we have yet much to learn. Questions of pruning, training, tillage of the soil, etc., are discussed as warmly among practical men as they were twenty years ago. Diseases, such as the "pear blight," are as much a mystery as ever.

The First Edition was hastily prepared, and was, consequently, imperfect. My intention was to revise and correct it very soon, but engagements, increasing from year to year, caused it to be neglected. Some five or six years ago I felt that, in many respects, it had fallen behind, and had its publication stopped. Then, seeing numerous other works on fruit culture appear, I concluded not to revise it. Lately, however, at the solicitation of friends, I have undertaken it; but, for several reasons, have not been able to give it the attention it demanded.

The most important part of the revision has been the lists of varieties of fruits which are now made to conform to recent experience. Several other parts, however, have been re-written, and others altered and corrected.

P. B.

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PART I.



GENERAL PRINCIPLES.

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GENERAL PRINCIPLES.

CHAPTER I.

NAMES, DESCRIPTIONS, AND OFFICES OF THE DIFFERENT PARTS OF FRUIT-TREES.

General Remarks.—A Tree is a living body, composed of many parts, such as roots, branches, leaves, buds, blossoms, fruit, etc. All these have different offices to fulfil, assume different forms and characters, and are known and designated from one another by different names, when subjected to the practical operations of culture. Without some knowledge of the names and structure of these different parts, of the principles that guide their development, their relative connection with, and influence upon one another, tree culture cannot be, to any man, really pleasant, intellectual, or successful; but a misty, uncertain, unintelligible routine of manual labor.

The industry of our times is peculiarly distinguished by the application of science—the union of theory with practice in every department; and surely the votaries of the garden, whose labors, of all others, should be intelligent, will not allow themselves to fall behind, and perform their labors in the dark.

Fully sensible of the importance of this preliminary study, and confident that the minute and practical details of culture cannot be well understood without it, I propose here, before entering upon the main subject, to describe, in as few and as plain words as possible, the structure, character, connection, and respective offices of the various

parts of fruit-trees, and the names by which each is known in practice.

SECTION 1.—THE ROOT.

THE ROOT is composed of several parts.

1st. The *collar* (*A*, fig. 1), which is the center of growth, or point of union between the root and stem, usually at or just below the surface of the ground. In root grafting seedlings, this is the point where the graft is set.

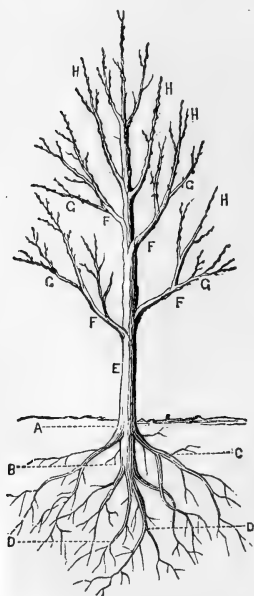


Fig. 1.—A TREE.

A, the Collar; *B*, the Main Root; *C*, Lateral Root; *D*, Fibres; *E*, Stem, or Trunk; *F*, Main Branches; *G*, Secondary Branches; *H*, Shoots of one year's growth.

immediately formed.

2d. The *body or main root* (*B*, fig. 1), which usually penetrates the earth in a *vertical* direction, and decreases in size as it proceeds downwards from the collar. It is also called the *tap-root*. A seedling that has not been transplanted has usually but one descending or tap-root, furnished, in all its length, with minute hairy fibres.

3d. The *lateral roots* (*C*, fig. 1) are principal divisions or branches of the main root, and take more or less of a spreading or horizontal direction. When seedlings are transplanted, a portion of the tap-root is cut off, and these lateral, or side roots, are

4th. The *fibres or rootlets* (*D*, fig. 1) are the minute hair-like roots which we see most abundant on trees that have been frequently transplanted. Different species of

trees vary much in their natural tendency to produce fibres. Thus the pear and the apple require frequent transplanting, and often root pruning, to produce that fibrous condition, which is necessary to great fruitfulness; whilst the roots of the paradise apple, used as a stock for dwarf trees, and the quince, are always quite fibrous, the former never, and the latter seldom, requiring root pruning.

The *Spongioles* is a term, which was formerly applied to the extremities of the root fibres, it being supposed that these tips were especial organs through which the plant absorbed its food from the soil. Later observations have shown that the absorbing surface of the rootlet is not at the very extremity, but just back of it; and that instead of there being a spongiole, or spongelet, the special office of which is to take up moisture, all the newly formed root surface does this work, in which it is facilitated by great numbers of *root hairs*, which are delicate projections from the surface, and so minute as to be only visible by the aid of a microscope. The root fibres are composed of soft, newly formed, delicate tissue, and are exceedingly susceptible of injury. The slightest bruise, or exposure to a dry or cold air, is fatal to them; and this is the reason why transplanted trees generally receive such a severe check, and so frequently die. If trees could be taken up in such a way that the root fibres could all, or mostly, be preserved, trees would receive no check whatever. By taking proper precautions, large trees are removed in midsummer without a leaf flagging.

The *Growth of Roots*.—The root increases in length by additions to its extreme point only. It does not extend throughout its whole length, as does the joint of a stem. This manner of growth allows it to accommodate itself to the obstacles that it meets in its course. The extremities of the roots, at first, consist of cellular tissue only, but soon woody fibre is formed in them, and their

internal structure is, essentially, like that of the stem, which will be described further along. The material for the growth of the root is supplied by the stem and leaves above, and these, in turn, are furnished with the crude material for their own support and enlargement by the roots. The parts of the tree above the surface of the ground, and those below it, are dependent each upon the other for growth and existence. Practical cultivators are familiar with many facts that illustrate the intimate relations and mutual dependency of the roots and stems. For instance, where one portion of the head or branches is much larger or more vigorous than the other, if the roots be examined, it will be found that those immediately under, or in direct connection with the largest branches, will have a corresponding size and vigor. In cases where one side of the top of a large tree is cut off, as in top grafting, a large number of new shoots are produced on the cut branch, and, if the roots be examined under, or in connection with this branch, a corresponding new growth will be found there. It is quite obvious, from these and similar facts, that whatever affects the roots or stems of trees, favorably or unfavorably, affects the whole tree. If the foliage of a tree be entirely removed in the growing season, the absorbent action of the roots is suspended; and if the absorbing portions of the roots be cut off, the growth of the top instantly ceases.

SECTION 2.—THE STEM.

The *Stem* is that part of a tree which starts from the collar, and grows upwards. It sustains all the branches, and forms the medium of communication between the different parts of the tree, from one extremity to the other.

Plants, like the grape, with twining, or climbing stems, are called *vines*; and such as have no main stem, but have

branches diverging from the collar, as the gooseberry, currant, etc., are called *shrubs*, or *bushes*. Where the stem is destitute of branches to some distance from the ground, it is usually called the *trunk*.

Different Parts of the Stem.—A stem, or branch of a tree, is composed of the following parts, which are distinctly observable when we cut it across. Figure 2 represents a portion of a stem of a young tree, one year old,

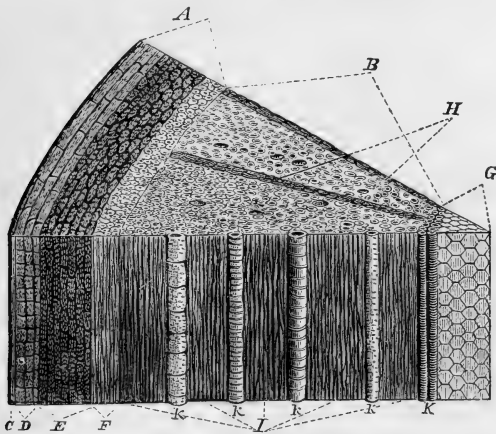


Fig. 2.—SECTION OF A STEM ONE YEAR OLD—MAGNIFIED.

A, Bark; B, Wood; C, Epidermis; D, Corky Layer; E, Green Layer; F, Inner Bark, or Liber; G, Pith; H, Medullary Rays; I, Woody Fibre; K, Dotted Ducts; L, Spiral Ducts.

so cut as to show a cross section, and a longitudinal one at the same time. The bark, included in the dotted line A, consists of an outer and inner bark.

The *Rind*, or *Outer Bark*, is composed of three layers.

1. The *Epidermis*, or *Cuticle* (C), which is found only on recent shoots, and the young parts of trees; this is thin, smooth, and delicate, like tissue paper, and is easily separated from the parts beneath it. Next within this is

2. The *Corky Layer* (D), which is usually of some shade of brown or ash color; this, seen through the epi-

dermis, gives to the young growth of trees its peculiar color, by means of which the experienced cultivator is enabled to distinguish varieties, even when not in leaf. Within the corky layer is

3. The *Green Layer* (*E*), which gives to the young shoots their green color. This, as the wood ripens, is soon covered by the corky layer.

The Inner Bark, or Liber (*F*).—This is the interior portion of the bark, in immediate contact with the wood. It is composed of perpendicular layers of soft, flexible but very tough fibres. It is this part of the bark of the Basswood that is used for tying in budding, etc., the tissue being separated by maceration.

The bark remains with these distinct layers, only for a few years. It scales off, and falls away in forms varying with the kind of tree, but in all cases a portion of the inner bark is left attached to the tree. In the grape-vine, the inner bark, or liber, is renewed each year, and that formed the year before is thrown off in long shreds.

Within the bark we have the wood, and in the center the pith. The wood is divided into

1. The *Sap-wood* (included in the dotted line *B*).—This is the youngest, or last formed, layer of wood, immediately below the inner bark. It is distinguished in all trees by being softer and lighter colored than the older parts.

2. The *Heart, or Perfect wood*.—This is the central, or interior portion of the stem, or branch, grown firm and mature by age. It is generally a shade darker in color than the newly formed part, or sap-wood. As the engraving, fig. 2, shows a stem only one year old, this is not represented.

3. The *Pith* (*G*).—This is the soft, spongy substance in the center of the stem and branches. In soft-wooded species, like the grape-vine, it is large; in hard-wooded species, as the apple, pear, quince, etc., it is small. In young shoots it is soft, green, and succulent, and fills an impor-

tant part in their development. In the old part it is dry, shrivelled, and seems incapable of taking any part in the process of vegetation, and this appears evident from the fact that trees often continue to flourish after the center, containing the pith, has begun to decay.

Structure of the Stem.—The stem is composed of woody fibre and cellular tissue, a substance similar to the pith. The woody fibre is arranged in perpendicular layers, and the cellular tissue in horizontal layers, running from the pith to the bark and connecting them. The mingling of these two systems gives to the surface of the cross section of a stem the beautiful veined or netted appearance observable in fig. 3, which represents the cross-section of an oak branch. The perpendicular layers of woody fibre are most clearly observable when we cut a stem vertically; they are then easily separated from one another. Fig. 3. — SECTION OF A BRANCH OF OAK. The layers, or plates of tissue radiating from the center to the circumference of the stem and inner bark are called the *medullary rays*. Two of these are shown in fig. 2, marked by the dotted lines *H*.

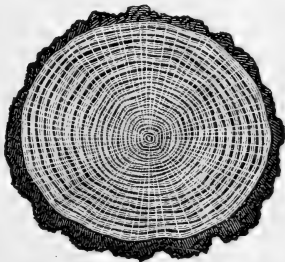


Fig. 3. — SECTION OF A BRANCH OF OAK.

Growth of the Stem.—The stem of a tree is originally the extension of the cellular tissue of the seed. As soon as leaves are formed they organize new matter, which descends and forms woody fibres: the layers sent down from the first leaves are covered by those sent down from the next, and so on, one layer after another is produced until the end of the season, when the leaves fall and growth ceases. A yearling tree has, therefore, a greater number of layers of woody fibre at the collar than at the top, and is, consequently, thicker; the second year the buds on the first year's growth produce shoots, and these

organize new layers of woody fibre, that descend and cover those of the previous year, and thus growth proceeds from year to year. Between each year's growth there is generally a line, in some cases more conspicuous than in others, that marks off the formation of each year, so that we are able to reckon the ages of trees with great accuracy by these rings. When it happens that a tree, from certain circumstances, makes more growth one season than another, we find the ring of that season larger. The new wood in all our northern trees is always formed between the inner bark and the last layer of wood, so that one layer is laid upon, and *outside* of another, and the bark is continually pressed outwards.

The new layers of bark are also formed at the same place, or *within* the previous one. From this mode of growth, it results that each layer of wood is more deeply imbedded as others are formed above it; and each layer of bark is pressed outwards as others are formed within it. In some cases, as in the cherry, for example, the bark is so tough as not always to yield to the general expansion of the tree, and slitting is resorted to for the purpose of preventing an unnatural rupture, which would eventually take place by the continued pressure of growth from within.

SECTION 3.—BRANCHES.

Branches are the divisions of the stem, and have an organization precisely similar: they are designated as,

1st. *Main Branches* (F, fig. 1); those that are directly connected with the stem or trunk. In pyramidal trees, they are called *lateral branches*. The branches of different species and varieties of fruit trees, differ much in their habits of growth; and it is highly important to the planter to consider these peculiarities, because certain habits of growth are better adapted to particular circum-

stances than others. Thus we have *erect branches* (fig. 4), which produce trees of an upright and compact form. *Curved erect branches* (fig. 5), proceeding almost horizontally from the stem for a short distance, and then becoming erect; these, also, form upright symmetrical heads, but much more open than the preceding. Also, *horizontal, or spreading branches* (fig. 6), that form wide-spreading

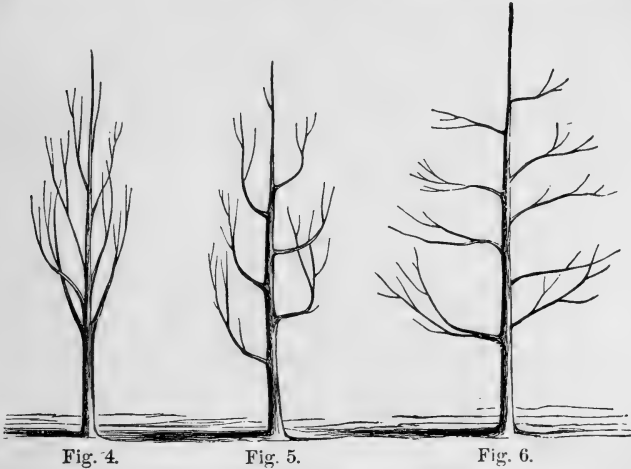


Fig. 4.

Fig. 5.

Fig. 6.

DIFFERENT HABITS OF GROWTH OF TREES.

Fig. 4, Erect; Fig. 5, Curved Erect; Fig. 6, Spreading, or Horizontal.

heads with irregular outline. And, lastly, *drooping branches*, when they fall below the horizontal line. The branches of most varieties of apples and pears become pendulous when they have borne for some time; and even in young trees of particular varieties, some of the branches assume a drooping and irregular habit.

2d. *Secondary Branches* (*G*, fig. 1), are the divisions of the main branches: occasionally those near the stem take such a prominent part in forming the outline of the tree, as to assume all the character of main branches, excepting in position.

3d. *Shoots* (*H*, fig. 1). This is the name by which young parts are designated from the time they emerge from the bud until they have completed their first season's growth. These have also important peculiarities that serve to distinguish certain varieties. They are variously designated as *stout* or *slender*, *stiff* or *flexible*, *erect* or *spreading*, *short-jointed* if the buds be close together,



Fig. 7.

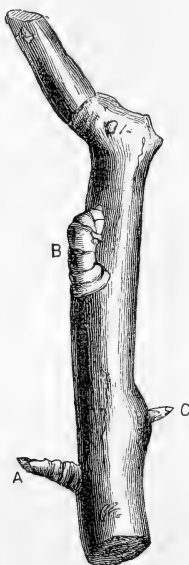


Fig. 8.



Fig. 9.

Fig. 7, Wood-branch of the Apple; Fig. 8, Fruit-branch: A, B, C, Young Fruit-spurs on two-year-old wood; Fig. 9, Fruit-branch of the Pear; A, B, C, Young Spurs on two-year-old wood.

and *long-jointed* when the contrary. The *colors* of their barks are also strikingly different, and form very obvious distinctions amongst varieties. The *Snow Peach*, for instance, has pale greenish shoots, by which it is at once distinguished. The *Jargonelle*, *Rostiezer*, and many other varieties of the pear, have *dark purplish* shoots, while the

Dix and *St. Germain* are quite *yellowish*, the *Glou Morceau*, *grey* or *drab*, and the *Bartlett* and *Buffum* quite *reddish*. The shoots of certain varieties of apples and pears, and especially plums, are distinguished by being *downy*, as they are furnished to a greater or less extent with a soft and hairy covering—in some cases barely observable.

4th. *Wood-Branches* (fig. 7), are those bearing only wood buds.

5th. *Fruit-Branches* are those bearing fruit buds exclusively. They are presented to us under different forms and circumstances, all of which it is of the highest importance to understand.

In *kernel-fruits*, such as the apple and pear, the most ordinary form of the fruit branch is that generally called the *fruit-spur* (*A, B, C*, figs. 8, 9, 10). It appears first as a prominent bud, as in fig. 8, on wood at least two years old; and for two or three seasons it produces but a rosette of leaves, and continues to increase in length, as in fig. 10. After it has produced

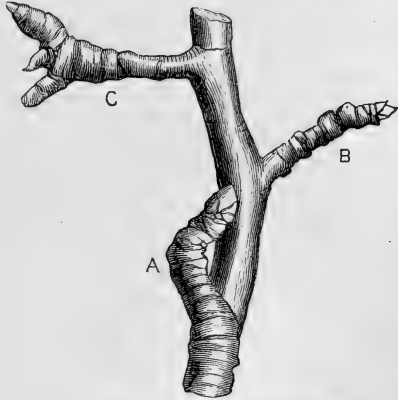


Fig. 10.—FRUIT-BRANCH OF THE PEAR.
A, B, C, Older Spurs.

fruit, it generally branches, and, if properly managed, will bear fruit for many years. Apple and pear-trees of bearing age, and in a fruitful condition, will be found covered with these spurs on all parts of the head, except the young shoots. In addition to the *fruit-spur*, there are, on the kernel-fruits, slender *fruit-branches*, about as large as a goose quill, and from six to eight inches in

length (fig. 11); the buds are long, narrow, and prominent, and the first year or two after their appearance, produce but rosettes of leaves, yielding fruit generally

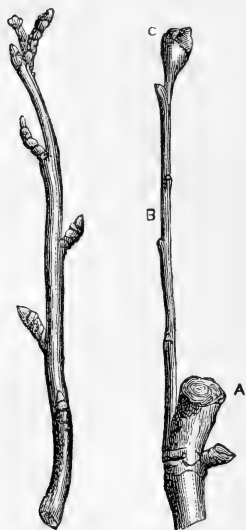


Fig. 11.

Fig. 12.

Fig. 11, slender fruit-branch of the apple—all the buds are fruit-buds. Fig. 12, a branch of the apple showing the tendency of some varieties to bear on the points of the branches. *A*, the point where the fruit was borne last season; *B*, a shoot of last year; *C*, its terminal fruit-bud.

about the third year. On trees well furnished with fruit-spurs, these slender branches are of little account, but they are useful on young trees not fully in a bearing state. They are generally produced on the lower or older parts of the branches or stem, and, in the first place, are slender shoots with wood-buds only; but owing to their unfavorable position and feeble structure, they receive only a small portion of the ascending sap, and the consequence is, they become stunted, and transformed into fruit-branches. In pruning young trees, slender shoots are frequently bent over, or fastened in a crooked position to transform them into fruit-branches of this kind; but this will be treated of in its proper place.

Certain varieties of apples have a natural habit of bearing the fruit on the points of the lateral shoots; and frequently these terminal fruit-buds are formed during the first season's growth of the shoot. Fig. 12 is an example; *A*, is the point where a fruit was borne last season; *B*, a shoot of last season; and *C*, its terminal bud, which is a fruit-bud. The fruit-branches of the *peach*, *apricot*, and *nectarine*, are productions of one season's growth; the fruit-buds form one season and blossom the next; but as

on the apple and pear, there are different forms of the fruit-branch.

In the first place the *fruit-spur* (fig. 13), a group of buds like a bouquet; these are little stunted branches on the older wood that have assumed this form. The most important fruit-branches of these trees are the vigorous shoots of last season's growth, containing both fruit- and wood-buds (fig. 14), and the slender fruit-branches, bearing all single fruit-buds, except a wood-bud or two at the base. Fig. 15,

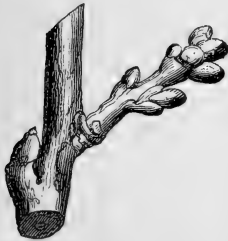


Fig. 13.—FRUIT-SPUR OF THE PEACH ON THE OLD WOOD.

represents such a branch of the peach, *A* and *B* being wood-buds. The fruit-branches of the *plum* and *cherry*, and the *gooseberry* and *currant* are similarly produced. A yearling shoot for instance, the second season, will produce a shoot from its terminal

bud, and probably shoots from two or three other buds immediately below the terminal, whilst those lower down will be transformed into fruit-buds, and produce fruit the third season. Fig. 16 is a branch of the cherry. *A* is the two-year-old wood; *B*, one year; *C* and *D*, fruit-spurs on the two-year-old wood, with a wood-bud usually at the point. Fig. 17 is a fruit spur from the older wood; *A*, the wood-bud at its point. Fig. 18 is a branch of the plum; *A*, the two-year-old wood; *B*, one year

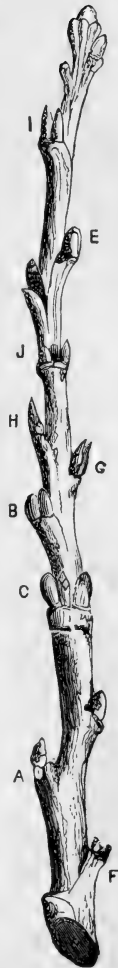


Fig. 14.

Fig. 14, mixed wood and fruit-branches of the peach; *B*, *C*, *D*, *E*, fruit-buds; *F*, *G*, *H*, leaf-buds; *J*, double buds; *C*, triple buds, the two side buds being fruit-buds, and the center one, a leaf-bud.

old; *C* and *D*, spurs. Fig. 19 is a fruit-spur from older wood. The wood-bud in the centre of these groups of buds on the spur enables them to increase in length every

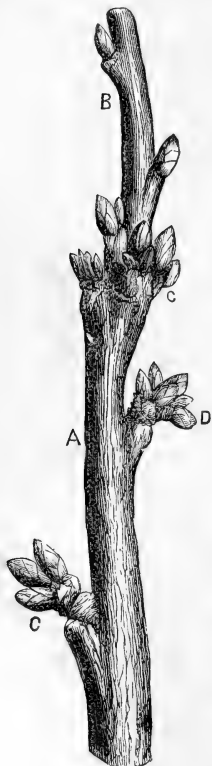


Fig. 16.



Fig. 17.



Fig. 15.

Fig. 15, a slender fruit-branch of the peach; all the buds except *A* and *B*, and the terminal one, are fruit-buds. Fig. 16, branch of the cherry; *A*, two-year-old wood; *B*, one year; *C* and *D*, fruit-spurs. Fig. 17, fruit-spur of the cherry; the bud *A*, in the center of the group, is a wood-bud.

season. New buds are produced to replace those that bear, and so the spurs continue fruitful for several years,

according to the vigor of the tree, and the manner in which it is treated.

The fruit-branches of the *quince* and the *medlar* are



Fig. 18.

Fig. 19.

Fig. 18, branch of the plum; *A*, two-year-old wood; *B*, one year old; *C* and *D*, spurs. Fig. 19, fruit-spur of the plum on the old wood.

slender twigs on the sides of lateral branches, and the fruit is borne on their points.

SECTION 4.—BUDS.

1st. *The Nature and Functions of Buds.*—In a practical point of view, buds are certainly the most important organs of trees, because it is through them we are enabled completely to direct and control their forms and their productiveness. Whoever, therefore, wishes to become a skilful and successful tree culturist, must not fail to

make himself familiar with all their forms, modifications, modes of development, and the purposes they are adapted to fulfil in the formation of the tree and its products. The immediate causes of the production of buds on the growing shoots of trees, and the sources from which they spring or in which they originate, are alike thus far mysterious, notwithstanding they have been the subject of a vast deal of research and speculation among the botanists and vegetable physiologists. We are able, however, to trace clearly and satisfactorily the objects they are intended to fulfil in the development of the tree, their connection with, and dependency upon other parts, and the circumstances under which they can be made to accomplish specific purposes.

Every bud contains the rudiments of, and is capable under favorable circumstances of producing, a new individual similar to that on which it is borne.

This fact is clearly demonstrated in the propagation of trees by budding, where a single eye is removed from one shoot and placed in the wood of another, to which it unites and forms a new individual similar to its parent. So in propagation by eyes, as in the grape-vine, where a single bud with a small portion of wood attached, becomes a perfect plant.

Every perfect bud we find on a young yearling tree or shoot is capable of being developed into a branch. Naturally, they all do not develope; but we know that by the application of art they can be readily forced to do so.

For instance, the buds of a yearling tree, if left to take their natural course, will only in part produce branches, and these will generally be nearer to the extremities, where they are the most excitable; but we can cause the lower ones to develope branches, by cutting off those above them to the extent that the particular character of the species or variety, or of the buds themselves in respect to vigor and vitality, may require. Hence it is that the

forms of trees are so completely under our control when we possess the requisite knowledge of the character and modes of vegetation of buds.

2d. *The Names and Characters of Buds.*—All buds are either, 1st, *terminal*, as when on the points of shoots (*C*, fig. 20); 2d, *axillary*, when situated in the angle made by the projection of a leaf from the shoot or branch (*A*, *B*, fig. 20); 3d, *adventitious* or *accidental*, when originating accidentally, as it were, or without any regularity, on the older parts of trees, and not in the axil of a leaf. They are often produced by the breaking or cutting off of a branch, or by a wound or incision made in the bark. In the management of trained trees, special means are taken

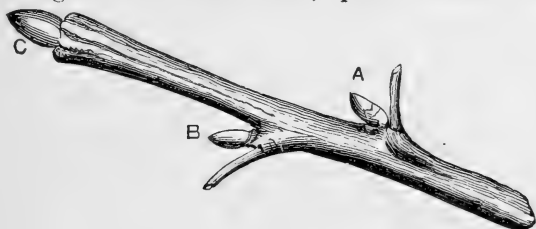


Fig. 20.

A, a superior bud; *B*, inferior; *C*, terminal: *A* and *B*, axillary.

to produce these buds on spaces of the trunk that it is desirable to fill up. We sometimes see instances of such buds on the stumps of old trees.

The terminal and axillary buds produced on young shoots, seem to have a different origin from these accidental buds—the former are connected with the pith of the shoot, as we may see by dissecting them. On cutting into a young shoot below a bud we find a cylinder of pith entering into the bud from the pith of the shoot, but we do not find this connection existing in the case of the adventitious buds.

Practically considered, buds are classified as follows:—

1. *Lateral.*—Those on the sides or circumference of

shoots, being the *axillary* buds of the botanist (*A*, *B*, fig. 20).

2. *Terminal*.—Those on the points of shoots (*C*, fig. 20).

3. *Superior*.—Those on the upper side of horizontal branches (*A*, fig. 20).

4. *Inferior*.—Those on the lower side of horizontal branches (*B*, fig. 20).

5. *Stipular*.—The small, barely visible buds found at the base of ordinary buds.

6. *Dormant* or *Latent*.—These are scarcely apparent buds, generally towards the base of branches: They may remain dormant for several years, and then, in some species, be excited into growth by pruning close to them.

Buds are again classed as *leaf-buds* and *fruit-buds*.

7. *Leaf-Buds* (*F*, *G*, *H*, fig. 14), produce either leaves or branches; they differ in form from fruit-buds in being in most cases longer and more pointed in the same species.

These are again designated as—

Single, when only one is produced at the same point (*H*, fig. 14).

Double, when two are together (*I*, fig. 14).

Triple, when in threes (*C* and *J*, fig. 14).

These double and triple buds are almost peculiar to the stone fruits, and especially the peach, apricot, and nectarine.

The size, form, and prominence of leaf-buds vary in a striking degree in different varieties of the same species, and these peculiarities are found to be of considerable service in identifying and describing sorts. Thus, the buds of one variety will be long, pointed and compressed, or lying close to the shoot. Others will be large, oval and prominent, or standing boldly out from the shoot. Others will be small, full, and round. For instance, the wood-buds of the *Glout Morceau* are short and conical, broad at the base, and taper suddenly to a very sharp point inclined towards the shoot; they have also very

prominent shoulders; that is, their base forms a prominent projection on the shoot. The scales are also dark, with light gray edges. In the *Josephine de Malines* pear the buds are quite remarkable for their roundness, bluntness, and prominence. If shoots of the *Bartlett* and *Seckel* pears, two well-known varieties, be compared, although they present no decidedly obvious peculiarities, yet they will be found very different. Those of the *Seckel* are much broader at the base, more pointed, and lighter colored, being a dark *drab*, whilst those of the *Bartlett* are *reddish*. These miscellaneous instances are chosen simply to draw attention to these points, and to show the ordinary modes of comparison. When we speak of leaf-buds, we have reference only to the simple bud and not to the large, pointed, spur-like productions frequently produced towards the middle or lower part of young shoots that have made a second growth; that is, where growth has ceased for a while and the terminal bud has been formed, and afterwards, in the same season, commenced anew, and made a second growth.

8. *Fruit-Buds*.—In the early stages of their formation and growth all buds are but leaf-buds. Thus, on a young shoot of the cherry and the plum, for example, of one season's growth, the buds are all leaf-buds. The next spring a part of these produce new shoots, and others are transformed into fruit-buds that will bear fruit the following season. The transformation is accomplished during the second year of their existence, and it usually happens that they are the smallest and least fully developed that are so transformed; the more vigorous pushing into branches. In the peach, the apricot, etc., on which the fruit-buds are produced in one year, the change from a leaf-bud to a fruit-bud occurs towards the latter part of the season. The primary cause of the transformation of leaf-buds into fruit-buds is not satisfactorily known, although many theories exist on the subject. Observation has taught us

many things in relation to it. It seems that all trees must acquire a certain maturity, either natural or forced, in order to produce blossoms or fruit. A tree that is furnished with a rich, humid soil, containing an abundance of watery nutriment, and left in all respects unrestrained in its upward growth, may attain the age of ten or fifteen years before it commences to form fruit-buds; while in a soil of a different quality, dry and less favorable to rapid growth, or if constrained in its growth by being grafted on some particular stock, or by some particular mode of training, it may produce fruit in two or three years.

An apple-tree on a common stock, planted out in ordinary orchard soil, does not usually bear until it is in most cases seven years old, and often more from the bud; while the same variety grafted or budded on a Paradise apple stock will produce in two or three years at most. We frequently see one branch of a tree that has been accidentally placed in a more horizontal position than the other parts, or that has been tightly compressed with a bandage or something of that sort, bear fruit abundantly, while the erect, unconstrained portion of the tree gives no sign of fruitfulness whatever. As a general thing we find that where there is an abundant and constant supply of sap or nutriment furnished to the roots of trees and conveyed by them through the unrestrained channels which the large cells and porous character of young wood afford, the whole forces of the tree will be spent in the production of new shoots; but that as trees grow older, the cells become smaller, and the tree being also more branched the free course of the sap is obstructed, and becomes in consequence better elaborated, or in other words more *mature*, and commences the production of fruit. Circumstances similar in all respects to these and answering exactly the same purpose, can be produced by art at an early age of the tree; and this is one of the leading points in the culture and management of garden trees, where

smallness of size and early fruitfulness are so highly desirable. This will come under consideration in another place.

Fruit-buds in most cases are distinguishable from wood-buds by their rounder and fuller form; the scales that cover them are broader and less numerous, and in the spring they begin to swell and show signs of opening at an earlier period. Like the wood-buds they are *single*, *double*, or *triple*, according to the number found together. They are *single* in pears, apples, and other trees of that class. *Single*, *double*, and *triple*, variously, on the stone fruits, gooseberries, and currants.

Fruit-buds are also *simple* and *compound*. *Simple*, as in the *peach*, *apricot*, and *almond*, each bud of which produces but one flower.

Compound, as in the *plum*, *cherry*, *apple*, *pear*, etc., each bud of which produces two or more flowers. Those of the plum produce two or three, hence we find plums usually borne in pairs; those of the cherry four or five (fig. 21), and of the apple and pear six to eight; and hence we often find these fruits borne in clusters. They

are also *lateral* or *terminal*, as they occupy the sides or ends of the branches or spurs on which they are produced. The ordinary position of the fruit-buds of different classes of trees will be understood from the preceding descriptions of fruit-branches.



Fig. 21.—FLOWER OF THE CHERRY,
SHOWING THE PRODUCT OF A
COMPOUND BUD.

SECTION 5.—LEAVES.

1st. *Structure and Functions of Leaves.*—The leaves, of all hardy fruit trees cultivated in our climate, are deciduous—that is, they decay and fall in the autumn, and are succeeded by others on the return of spring. The offices they perform during the growing season are of the highest importance to the life and health of the tree, and deserve the most attentive consideration.

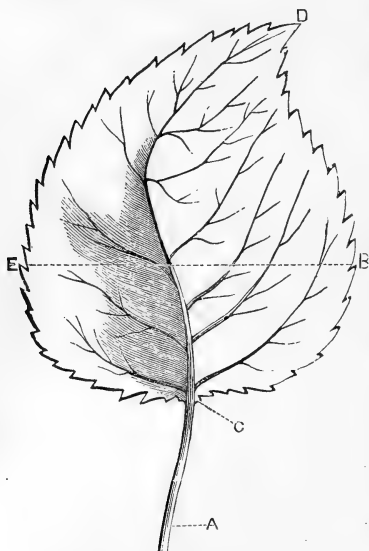


Fig. 22.—A LEAF OF THE PEAR.

A, the petiole, or leaf stalk; *B, C, D, E*, the blade; *C*, the base; *D*, the point; Line *E, B*, the width.

A leaf (fig. 22) is composed of two principal parts, the *leaf-stalk*, or *petiole* (*A*), which connects it with the tree or branch, on which it is borne, and the expanded part (*B, C, D, E*), called the *blade*. The *base* is the end (*C*), attached to the stalk, and the *apex*, or *point* (*D*), the opposite one. The *length* is the distance from the base to the point (*C* to *D*), and the *width*, a line cutting the length at

right angles, and extending from margin to margin (*E* to *B*).

The leaf-stalk and its branches, forming the nerves or veins of the blade, are composed of woody vessels, similar to the woody parts of the tree or branch that bears it, inside of which is a pith, similar to the pith of the tree; the leaf is thus connected with the pith and wood of the

shoot, and consequently with the ascending sap, as we may readily see, by making a vertical cut through the leaf stalk and shoot. The spaces between the veins of the leaf are filled up with a cellular substance similar to the pith, called *parenchyma*, and the whole is covered with a thin skin, *epidermis*. The cellular substance of the leaf is connected with the inner bark, and consequently with the descending sap, or cambium, that forms the new layers of wood. Both surfaces of the leaf are furnished with small pores, through which exhalation and absorption are carried on; these are most abundant on the lower surface.

This property of the leaves to receive and give out air and moisture through the pores on their surface, has caused them to be likened to the lungs of animals, and this comparison is, to some extent, correct; for we know that, without leaves, or organs performing their offices, trees do not grow; and, in proportion to the natural and healthy action of the leaves, do we find the vigor and growth of the tree.

To prove that leaves have the power, in a greater or less degree, to absorb fluids, we have but to apply water to the drooping foliage of a plant suffering from drouth, and see how quickly it becomes refreshed. The dews of a single night, we know, too, will revive plants that the heat and drouth of the previous day had prostrated; and even if we put a flagging plant in a damp atmosphere, it recovers. The leaves of a bouquet can be kept fresh for a long time by sprinkling them with water.

That plants *exhale* moisture and gases, cannot be doubted. It is this very exhaling process that causes plants to wilt under a hot sun, or in a dry atmosphere. Plants that are transplanted with their foliage on, as annuals are in the spring or summer, will wilt, and even die, if exposed to the air and sun; but if transplanted in a moist day, or covered, so that evaporation cannot take place,

the plant does not appear to feel the removal. So with cuttings of many plants thus propagated; if placed in the earth with a certain amount of foliage on, and left uncovered, they will immediately die; but when we place a bell-glass or a hand-glass over them, to prevent evaporation, they remain as fresh as though they had roots supplying them with moisture from the soil. It is on this account that transplanted trees so often die, when the branches and shoots are not in proportion to the roots. In transplanting, a portion of the roots is destroyed, and all are more or less deranged, so that their functions are feebly performed for some time after planting. If all the branches and shoots are left on, they will, as usual, produce leaves; but the absorption at the roots being so much less than the exhalation of the leaves, the juices contained in the tree, previously laid up, soon become exhausted, the leaves droop and wither, and the whole fabric perishes. In budding, too, if the whole leaf were left attached to the bud, the evaporation would be so great as to kill the bud; hence we remove all but a portion of the stalk.

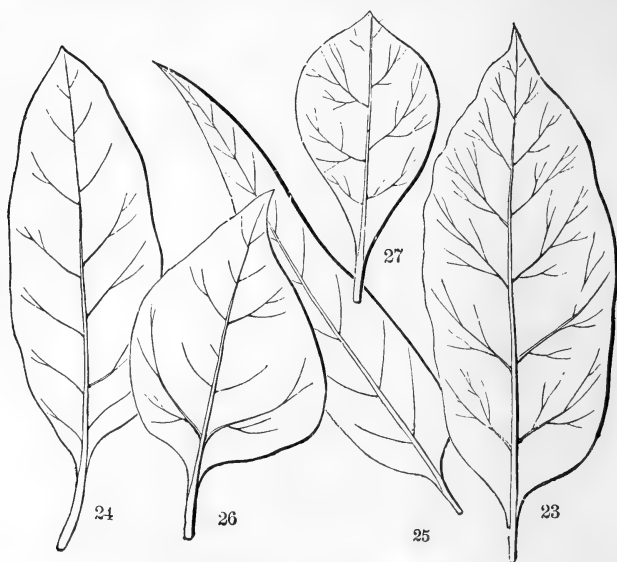
A tree can neither mature its wood nor its fruit without the full and healthy exercise of the leaves. If, in the growing season, a tree is deprived of its foliage by blight, insects, etc., we see that growth is entirely suspended for a time, until new leaves are developed; and if the leaves be removed from a tree bearing fruit, we see the fruit shrivel and dry up, or ripen prematurely, and become worthless. These facts, and many others that might be cited, show the intimate connection existing between the leaves and the other organs of trees, and the influence they have on their growth and productiveness. It is believed that the opening of the leaf buds in spring induces the formation of new roots; this is doubtful, as new roots may be seen forming at times when there are no leaves on the tree, and apparently no growth whatever going on in the buds. But it is well known that they will soon cease

to grow if leaves do not make their appearance. We observe in the case of trees, the tops of which have been so much injured by drying and exposure, that scarcely a sound bud is left to grow ; in this case the roots, although in perfect order, remain nearly dormant until new shoots and leaves are produced, and in proportion as the leaves increase, so do the roots. The fact of the absorption and exhalation by leaves of certain fluids, has, to a very considerable extent, established the theory that the sap of trees is taken up from the roots, through the cells or sap vessels of the wood of the trunk and branches, in a *crude state*, and passes into the leaves ; that in their tissue, spread out under the sun's rays, it receives certain modifications. Carbonic acid, which has been taken in a state of solution from the soil, and by the leaves from the atmosphere, is decomposed, its oxygen is given off into the air, carbon becomes fixed, and thus the component parts of the tree, the material of the cells, starch, sugar, gum, etc., are formed. After passing through this purifying or concentrating process, the sap acquires a more solid consistence, and is called *cambium* ; so prepared, it returns downwards through the nerves or vessels of the leaf to the base of the leaf stalk, and then between the wood and bark of the stem, forming new layers on its passage. Such is, at present, the most popular theory of the functions of the leaves, and the ascent, assimilation, and descent of the sap. Some distinguished writers on the subject reject this theory, alleging that " there is no such thing as crude sap ; that as soon as it enters the roots it becomes assimilated, and fit for the production of new cells, and that it passes upwards, forming new wood or cells by a chemical process."* Observation, however, has clearly established that, in the leaves of healthy trees, chemical processes, depending on light and heat, and absolutely essential to

* Schleiden's Principles of Botany.

the well-being of the tree, are continually going on ; for trees shut out from the light always make a feeble growth, and have a blanched and sickly hue, compared with the same species in the free air, and exposed to the rays of the sun. If one side or portion of a tree is shaded or deprived of its full share of light, it ceases to grow in its natural way, and the shoots are lean, slender, and imperfect.

2d. *Different Forms and Characters of Leaves.*—The



Figs. 23 to 27.—FORMS OF LEAVES.

23, oval ; 24, oblong ; 25, lanceolate ; 26, ovate ; 27, obovate.

different sizes and forms of the leaves of fruit trees, the divisions of their edges, the absence or presence of glands, the smoothness or roughness of their surfaces, are all, more or less, serviceable in describing and identifying varieties.

The terms designating forms are seldom mathemati-

cally correct, but merely made by comparison; for instance—

Oval (fig. 23), when about twice as long as broad, and nearly of equal width at both ends.

Oblong (fig. 24), three times, or more, longer than broad, and differing but little in width in any part.

Lance Shaped, or *lanceolate*, (fig. 25), when much longer than broad, and tapering gradually to a sharp point.

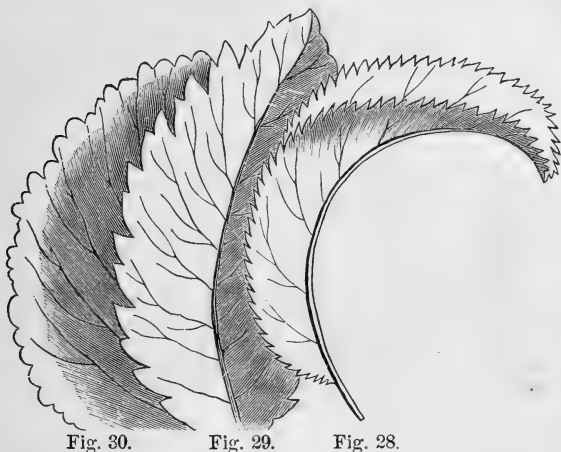


Fig. 30.

Fig. 29.

Fig. 28.

Fig. 28, a leaf, folded, reflexed, and finely serrated, or toothed; Fig. 29, coarsely serrated; Fig. 30, crenate or scalloped.

Ovate (fig. 26), when twice as long as broad, tapering to the apex, and widest towards the base.

Obovate (fig. 27), the reverse of ovate, the greatest diameter being in the upper part.

Round, *roundish*, approaching a circular form, like fig. 22.

The apex or point is often a distinguishing feature; some leaves terminate suddenly in a sharp point, others are drawn out to a long, sharp point, *peaked*, whilst others are nearly round. Leaves differ much, too, in the form of the

base; some are rounded, some sharp, and some heart-shaped.

The divisions of the edges are *serrated*, or *toothed*, when the edges are cut into sharp teeth, directed towards the point of the leaf; *finely* (fig. 28) or *coarsely* (fig. 29) *serrate*, as these teeth are fine or coarse; *doubly serrate*, when the principal division, or tooth, is subdivided.

Crenate, or *Scolloped* (fig. 30), when the divisions are rounded, instead of being sharp, like teeth.

Lobed, when deeply cut, and the penetrating angle large, as in the currant, gooseberry, grape, etc. (Fig. 31.)



Fig. 31.—LEAF OF THE CURRANT, LOBED.

Flat, when the surface is even (fig. 22).

Folded, when the edges are turned inward (fig. 28).

Reflexed, when the apex, or point, turns backwards, giving the leaf, more or less, the form of a ring (fig. 28).

Waved, *wrinkled*, *smooth*, *rough*, etc.,

are terms well enough understood, used in describing leaves.

The leaf-stalk has often striking peculiarities in certain varieties, such as unusually *long*, *stout*, *short*, or *slender*. There are sometimes *glands* on the leaf-stalk, close to the base, and, in certain cases, on the leaf itself, that are chiefly taken notice of in identifying varieties of the peach and nectarine; these differ in shape, too, being *globular* (as in fig. 32), *reniform*, or *kidney-shaped* (fig. 33); these

little glands are supposed to be, and no doubt are, organs of secretion.



Fig. 32.

Fig. 33.

Fig. 32, a leaf of the peach, with globular glands; Fig. 33, the same, with reniform, or kidney-shaped glands.

These are all interesting items in the study of the beautiful and almost endless variety of forms which the different classes of fruit trees, - and even different varieties of the same class, exhibit

in their foliage.

SECTION 6.—FLOWERS.

1st. *Different Parts of Flowers.*—Flowers are the principal reproductive organs of trees, and consist of floral envelopes, the *calyx* and *corolla*; and of sexual organs, *stamens*, and *pistils*. Fig. 34, which represents a flower

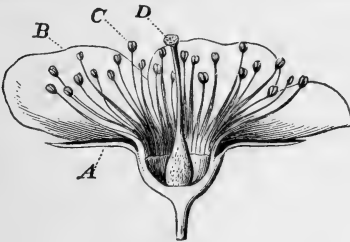


Fig. 34.

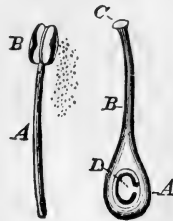


Fig. 35. Fig. 36.

Figs. 34 to 36.—DIFFERENT PARTS OF A FLOWER.

Fig. 34, flower of the peach cut open longitudinally, A, the calyx; B, the petals; C, stamens; D, pistil. Fig. 35, a stamen, A, filament, or stalk; B, anther. Fig. 36, the pistil, A, ovary; B, style; C, stigma; the ovary is cut open to show the ovule, D.

of the peach cut open lengthwise, shows the different parts and their position.

The *Calyx* (A, fig. 34,) is the outer covering, and is usually green, like the leaves. Its parts are called *sepals*.

These are either distinct or more or less united by their edges. The united portion is called the *calyx-tube*, and the free points the *segments*.

The *corolla* (*B*, fig. 34,) is within the *calyx*, and is the colored, showy part of the flower; its divisions are called *petals*.

Stamens (*C*, fig. 34), immediately within the petals, are the male organs of plants. The delicate, thread-like *filament* (*A*, fig. 35), supports, on its extremity, the *anther* (*B*, fig. 35). This contains a powdery substance, the *pollen*, which is liberated when the anther is mature.

The *pistil* (*D*, fig. 34 and fig. 36,) is the female organ, and stands in the center of the flower. It consists of the *ovary*, at its base (*A*, fig. 36), which contains the ovules or rudiments of seeds. The *style* (*B*, fig. 36) is the elongated portion, and the *stigma* (*C*, fig. 36,) is the portion that receives the fertilizing powder (pollen) from the anthers. The stigma is usually rounded like a knob, but frequently it is inconspicuous.



Fig. 37.—FLOWERS OF THE SILBERT.

Flowers may be deficient in any of these organs except the *anthers*, *ovary*, and *stigma*. These are indispensable to fructification, and must be present in some form or other, or the flowers will be barren.

2d. *Sexual Distinctions*.—The fact that the two sexes, or sexual organs, the *stamens*, and *pistils*, are, in certain species, united on the same flower, and in others on dif-

ferent flowers, and even on different trees, has created the necessity for the following distinctions:

Trees or plants are called *hermaphrodite* (as in fig. 34), when both *stamens* and *pistils* are present on the same flower. Nearly all our cultivated fruits are of this class. *Monœcious*, when the male and female flowers are borne on the same tree, as in the filbert flower (fig. 37, *A*, the male, and *B*, the female flowers).

Diœcious, when the male flowers are on one plant, and the female on another. A familiar instance, among cultivated plants, is the *hop*. The *strawberry* is not truly diœcious, but in many varieties we find the stamens or male organs so incompletely developed (fig. 38), that they are of no service in fructifying the flowers. Such varieties are termed pistillate, and we plant near them varieties with an abundance of these organs, strongly developed, as in fig. 39.

3d. *Impregnation*.—The process of impregnation is effected in this way: When the flowers first open, the pollen granules are contained within the anther. In a short time, after the flower opens, the anther bursts, usually by a longitudinal slit, and sometimes by other kinds of opening, and the pollen is let fall upon the stigma, or is carried to it by means of the insects that frequent the flowers in search of pollen and honey. The stigma is furnished with a glutinous, or sticky secretion, to which the pollen adheres; there it prolongs a minute tube, which penetrates through the style of the pistil to the ovary, where it reaches the ovule, and impregnation takes place; new cells are formed within the ovule, which results in the production of an embryo plant.

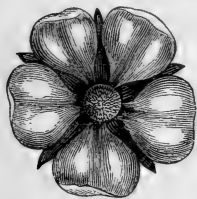


Fig. 38.—FEMALE, OR PISTILLATE FLOWER OF THE STRAWBERRY.

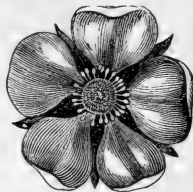


Fig. 39.—HERMAPHRODITE FLOWER OF THE STRAWBERRY.

This impregnation is sometimes, from certain causes, only partially effected in the cases of fruit where the ovary, or seed vessel, is composed of several cells, as in the apple, pear, etc., and hence the fruit takes an imperfect, one-sided development from the beginning.

The difficulty that appears to arise in the way of the impregnation of the stigma of one flower by the pollen of another, distantly situated, either on the same plant, as in monœcious trees, or on different plants, as in the diœcious ones, is wonderfully obviated by the provision that nature has made for its transmission—not only by the atmosphere, but by insects, that pass from one flower to another, feeding on their honeyed secretions; the pollen adheres to the bodies of the insects, and they carry it from one flower to another.

All natural flowers, of the same species, present the same number of petals in their flowers; but occasionally the *stamens* are converted into petals, and thus, what are called *double* flowers, are produced. Among fruit trees we have double-flowering apples, plums, peaches, and cherries. These seldom produce fruit; when perfectly double, *never*. Many of our double flowers, roses, pæonies, etc., have been obtained by this transformation of the stamens into petals. It is supposed to be caused by an excessively high cultivation given to the plants that produce the seeds from which these double varieties spring.

4. *Period of Blossoming*.—In treating of fruit-buds, allusion has been made to the causes which, according to observation and experience, promote fruitfulness. These are chiefly a slow or moderate growth, and a branching or spreading, constrained form, instead of an upright one. Some species of trees bloom at a much earlier age than others. Thus the peach, the apricot, and the cherry, will bloom in nearly one-fourth less time from the bud, all things being equal, than the pear. Some species bloom

at an earlier period of the season than others; the apricot and the peach bloom very early, and this is the chief reason why the crop is so often destroyed in localities subject to late spring frosts. Among fruits even of the same species there is much difference in the period of blooming—one variety of apple being nearly two weeks later than another. This, in some sections, is an important quality, where every day that the blossom is retarded renders the crop surer, from its being more likely to escape frost. These differences are caused by various circumstances.

1st. The *Climate*.—The period of blossoming of the same species varies much in different localities. Rochester is at least a week earlier than Buffalo, although the distance is less than one hundred miles; and it is nearly two weeks earlier than Toronto, which is still nearer. The large bodies of ice in the lakes, at both Buffalo and Toronto, have, no doubt, a considerable effect in retarding the blossoming period.

2d. The *Season and Position*.—In the same locality, one season is frequently a week earlier than others, and trees on the south side of a wall or building will expand their blossoms several days before the same variety in the open ground, only a few rods distant, and ten days to a fortnight before those on a north wall.

3d. The *Soil*.—On warm, and light soils, the roots of trees are excited into activity much sooner than in cold, damp, and heavy soils, and the blossoming period is earlier in consequence.

The *Different Characters of Flowers*.—Flowers vary in *size, form, color*, and other qualities, even in the same species. In the peach, these distinctions are so obvious, that one of the principal classifications of pomologists is founded on them. Thus there are varieties with *large showy flowers* (fig. 40), as the *Serrate Early York*, and small (fig 41), as *Large Early York*, *Crawford's Early*, etc. The color also presents variations, some being

deep, others *pale* rose, and some *almost white*; two or three varieties of the peach have flowers wholly white, as the *Snow Peach*, for instance. In all the other fruits, as in *apples, pears, plums, cherries*, etc., the flowers



Fig. 40.



Fig. 41.

Fig. 40, large flower of the peach; Fig. 41, small flower of the peach.

vary but slightly in form and color, and the differences are only taken note of in very full and minute scientific descriptions. A few cases, however, are well marked, as the *Jargonelle* pear, the flowers of which

are nearly twice as large as those of most other pears.

In connection with the flowers, it may be proper to explain the important process of

Hybridization.—This is performed by fertilizing the pistil of one species or variety, with pollen from the stamens of another. The seeds produced by the flower so impregnated will produce a cross, or hybrid, between the two parents. This process is now well understood, and is carried on to a wonderful extent, especially in the production of new flowers. Comparatively few of our popular fruits have been produced in this way. A few good sorts have been produced by the late Mr. Knight, a distinguished English experimentalist, who effected much in his time towards establishing many difficult and disputed points in vegetable physiology. Nearly all the native fruits of this country are accidental hybrids, or seedlings. A vast deal may be done to improve, in this way, all our fruits. The size, hardiness, and productiveness of one variety may be combined with the delicacy of texture and flavor of another, and endless variations and improvements may be effected. To obtain a true hybrid, certain precautions are necessary. The two subjects selected must flower at the same time. The stamens must be carefully removed from the one intended for the mother, without injury to

the stigma. It must also be guarded from accidental impregnation by other varieties, and the pollen from the selected male be applied at the proper moment—that is, when it bursts from the anther. Hybridization is only possible between species *closely related*; for, although there is a relation between the *apple* and the *pear*, and between the *gooseberry* and the *currant*, they will not hybridize; but different *varieties* of the apple will hybridize with each other, and so with all the rest.

It has been regarded as impracticable to hybridize the native with the foreign grape, but several parties claim to have at length succeeded. The varieties thus produced will be found in the descriptive list of grapes.

Several parties have, from time to time, claimed to have succeeded in crossing the Monthly Alpine Strawberry with some of the large fruited sorts, but no instance of this kind has yet come to our knowledge, properly authenticated. It very often happens that the process of artificial impregnation fails, and a pure seedling of one of the parents, instead of a hybrid, is the result.

The prospects now are that hybridization, better understood than formerly, will yield important results in the amelioration of fruits.

[Since writing the foregoing, I understand that Colonel Wilder has really succeeded in producing hybrids between the Alpine and Hautboy species and the large strawberries, a march of great importance.]

Blossoming in Alternate Years.—Many varieties of apples, pears, etc., fruits that take the whole season to mature, produce flowers in alternate years only, with great regularity. The reason is supposed to be this: The fruit, during the bearing year, attracts a large quantity of the ascending sap of the tree in the same way as the leaves do; but instead of returning it to the tree, it is appropriated by the fruit to its own growth. The consequence is, the buds that would have blossomed the following year, if

they had received their due share of nutriment, fail in attaining the proper condition, and produce only rosettes of leaves. During the unfruitful season, immense quantities of fruit-buds are again brought forward, and the year following, the tree is overloaded ; so it proceeds in regular alternation.

This is never experienced in trees regularly pruned, and may be remedied by thinning out the crop in bearing years, leaving on but a reasonable amount, that will not exhaust the tree. The bearing years have been completely reversed by removing the blossom-buds, or fruits, on the bearing year.

SECTION 7.—THE FRUIT.

1st. *Character of the Fruit.*—As soon as the ovules are impregnated, the ovary begins to swell ; the petals, stamens, and other parts of the flower fall off, and we then say the fruit is “set.” As a fruit-bud is but a transformed leaf-bud, a fruit occupies the same relative connection with the tree as a branch ; it attracts food from the stem and the atmosphere in the same manner, and performs all the same functions, except that it does not, like the leaf, return anything to the tree, but appropriates all to its own use ; and this is the reason, as we have before remarked, that trees having borne a heavy crop of fruit one season, are less fruitful the next—this is the case only with fruits, as the apple and pear, that require nearly the whole season to mature them. Cherries and other fruits, that mature in a shorter period, and that draw more lightly on the juices of the tree, do not produce this exhaustion, and consequently bear year after year uninterruptedly.

2d. *Classification.*—In some fruits, as the apple, for instance, the fruit appears to be formed *below*, or at the base of the calyx ; structurally, it is properly regarded as an adhesion of the greater part of the calyx to the ovary ;

the segments, or points of the calyx are still visible in the mature fruit, and often serve, to some extent, by their size and other peculiarities, as being spread out, or closed together in a point, to identify varieties. In other species, as the plum and cherry, the fruit is formed *within* the calyx, or above it. Fruits of the former character, forming below the calyx, and including it in their structure, are classed as *inferior*—the *apple, pear, quince, gooseberry, and currant*, are all inferior, having the calyx adhering.

Those formed within the calyx, and free from it, are called *superior*; such are the *peach, plum, apricot, nectarine, cherry, raspberry, strawberry, and grape*.

The more natural, popular, and useful classification of fruits is that by which they are divided into

Pomes, or Kernel Fruits, as the *apple, pear, quince, medlar*, etc. In speaking of these, we call the enlarged accessory parts the *flesh*, and the dry, bony, seed capsules, the *core*.

Drupe, or Stone Fruits, are those which have a pericarp of two kinds; the outer part soft and pulpy, the *flesh*, and the inner one hard and bony, the pit, or stone, which encloses the seed in a shell, like a nut; as the *peach, plum, apricot, cherry*, etc.

Berries.—These have soft, pulpy flesh, containing seeds; as the *gooseberry, currant, and grape*.

Compound Berries, like the *raspberry, and blackberry*, are made up of minute separate fruits, each like a stone fruit, on a very small scale. In the *strawberry*, the fruits proper are the seed-like ripened ovaries, which are more or less imbedded in a large, fleshy receptacle, which is an enlargement of the end of the flower-stalk.

Nuts, as the *filbert, chestnut*, etc., are fruits with a hard, bony covering, which are often contained in husks, or cups, that, when ripe, open and let the fruit drop.

The outlines, or forms of fruits, and their colors, exhibit great variations, even in the same species. Every portion

of the fruit, as the *skin*, *flesh* (*C*, fig. 42), *core* (*E*, fig. 42), *seeds* (*D*), or *stones*, *stems* (*A*), and in kernel fruits, the *calyx* (*B*), has, in some cases, marked peculiarities, and in others, they are more minute and scarcely perceptible; but

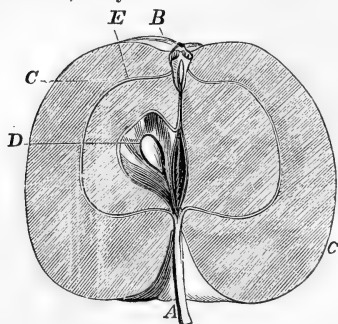


Fig. 42. — VERTICAL SECTION OF AN APPLE, SHOWING ITS DIFFERENT PARTS.

A, the base; *B*, the eye; *C*, the flesh; *D*, the seed; *E*, the core; *A*, stem; *B*, calyx.

yet, in a strictly scientific study of pomology, they are of more or less service. It would be foreign to the purposes of this work to notice these points in detail; all that is deemed necessary, useful, or appropriate, is to point out well-defined and practical distinctions, and the terms ordinarily made use of in popular descriptions.

3d. *Different Parts of the Fruit:*

The *Base* (*A*) is the end in which the stem is inserted.

The *Eye* (*B*) is the opposite end, in the apple, pear, etc., that have an adhering calyx.

The *Neck*, in pears, the contracted part near the stalk, as seen in fig. 50.

The *Point* is the end opposite the stem in stone fruits, berries, etc., that have no calyx, and consequently no *eye*.

The *Length* is the distance from stem to point, or eye, *A* to *B*, fig. 42.

The *Width*, a line cutting the fruit across, or at right angles with the length.

The *Basin*, the depression around the eye, or calyx, in kernel fruit, *B*, fig. 42.

The *Cavity*, the depression around the stem.

The *Suture*, in stone fruits, the furrow-like depression running from the base to the point.

4th. *Different properties of fruits:*

Besides the principal divisions which have been alluded to, fruits are considered in regard to their *size, color, form, texture, flavor, and season of ripening.*

1st. The *Size*.—Besides the natural difference in size that exists among different varieties of the same species, as, for instance, between the *Bartlett* and *Seckel Pears*, or the *Full Pippin* and *Lady Apples*, there are great differences between the same varieties, owing chiefly to the following circumstances: *Soil*.—We find that, in new and fresh soils, the nutritive properties of which have not been impaired by cultivation, as in the virgin soils of the West, fruit of the same variety attains nearly *double the size* that it does in older parts of the country, where the soil has long been under cultivation; and that in the same orchard, the tree growing in a deep, alluvial soil, will give fruit much larger than the one on a hard, gravelly knoll.

Culture.—This has an important influence on the size of fruits. If an orchard has been for several years neglected, and the ground about the trees become covered with grass and weeds, the fruit is small; and if the same orchard be plowed up, some manure turned in around the roots, and the ground be kept loose and clean by tillage, the fruit will double in size in a single season. *Seasons*.—In a dry season, when the supply of moisture at the roots and in the atmosphere is very limited, fruits are invariably smaller than in seasons of an opposite character. *Number of fruits on the tree*.—This affects the size of the fruit to a great extent in all seasons, soils, and climates, and under all grades of culture.

It is perfectly obvious, that the greater the number of fruits a tree bears, the smaller they will be; for, as they derive their sustenance from the tree, a large number cannot be so well supplied as a smaller number. We cannot go into an orchard where there are many varieties without seeing an illustration of this. Here is a prolific

variety, *loaded* in every part; the fruits are small, certainly not over medium size. There is a moderate bearer; its fruits are thinly and evenly distributed over the tree; its fruits are, consequently, *large*. So in the case of fruits that have been thinned; that is, a certain portion removed while young, either by accidental circumstances, or by design; every specimen is twice as large, as if the whole crop had been allowed to mature. The English gooseberry growers, in preparing their prize specimens, leave but a few on each bush—not over a twentieth, or perhaps a fiftieth part of the entire crop. So in peaches, grapes, etc., grown carefully in houses. Where the size and beauty of the fruit, and the health and vigor of the trees are kept in view, a large portion of the crops, from one-half to two-thirds, is thinned out before maturity. *Age of the trees*.—This influences the size of fruits to a great extent; we see fruit so large on young trees, as to be entirely out of character. As trees grow older, the vigor decreases, and the number of fruits increase, and they are consequently diminished in size. *The kind of stock* has a tendency to modify the size; thus we find many pears much larger on the *quince* stock than on the pear, and many apples larger on the *Paradise* than on the common apple stock. The reason of this is, no doubt, that on the quince and Paradise the juices of the tree are better prepared, richer, and better suited to the growth of the fruit. In the common pear and apple stocks, the sap is taken up in greater quantities, is watery, and better adapted to form wood than fruit.

CLASSIFICATION OF SIZE.

The terms qualifying the sizes of fruits are always given comparatively, in regard to the two extremes, the *largest* and the *smallest* of the species; for instance—in apples, we may consider the *Gloria Mundi* and *Twenty Ounce* as *extremely large*, and the *Lady Apple* as *extremely small*.

The terms used, therefore, are such as to represent the various grades between the two extremes. These are

Very large, as the *Gloria Mundi* Apple, *Duchesse d'Angoulême* Pear, *Crawford's Early* Peach, *Yellow Egg* Plum, and *Napoleon Bigarreau* Cherry.

Large, as the *Baldwin* Apple, *Bartlett* Pear, *Red Cheek* Melocoton Peach, *Washington* Plum, and *Black Eagle* Cherry.

Medium, as the *Rambo* Apple, *White Doyenne* Pear, *Imperial Gage* Plum, and the *American Amber* Cherry.

Small, as the *Early Strawberry* Apple, *Dearborn's Seedling* Pear, *Green Gage* Plum, and *Bauman's May* Cherry.

Very Small, as the *Amire Johannet* Pear, *Lady* Apple, *Winter Damson* Plum, and the *Indulle (Early May)* Cherry.

The distance between some of these grades, as between medium and large, etc., is so short, that they are frequently confounded; still, they give a notion of comparative size that answers all practical purposes. It would, perhaps, have been more accurate, and, at the same time, more satisfactory to persons entirely unacquainted with fruits, to have given the comparative measurement of these different grades in inches and parts; but the varieties quoted as examples are common, and very generally known.

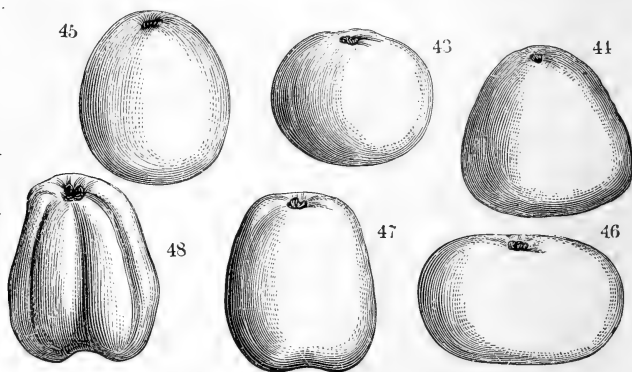
2d. *Form*.—It is exceedingly difficult, even impossible, to find any single term that will give a mathematically accurate notion of the forms of fruits; for, although we call an apple round or conical, it may not be, strictly speaking, either; very likely it partakes, to some extent, of both forms. But that is no reason why we should designate it *conical round*: we simply call it *round*, or *roundish*, if nearer round than any other form; and if it inclines slightly to the conical, we cannot in any other way so well convey the knowledge of that fact as by simply saying so.

In the apple, the *round* form prevails, and in the pear, the *pyramidal*; hence, it is necessary to apply a different class of descriptive terms to each.

FORMS OF APPLES.

Round or Roundish (fig. 43).—When the outline is round, or nearly so, the length being about equal to the breadth.

Flat (fig. 46).—When the ends are compressed, and the width considerably greater than the length.



Figs. 43 to 48.—FORMS OF APPLES.

43, round; 44, conical; 45, ovate; 46, flat; 47, oblong; 48, ribbed.

Conical (fig. 44).—In the form of a cone, tapering from the base to the eye.

Ovate, or egg-shaped (fig. 45).

Oblong (fig. 47).—When the length is considerably greater than the width, and the width about equal at both ends, not tapering as in the conical.

In addition to these forms and their various modifications, some varieties are

Angular, having projecting angles on the sides.

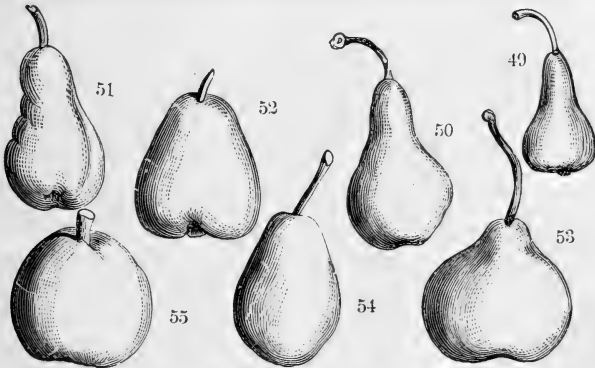
One-sided, having one side larger than the other.

Ribbed (48), when the surface presents a series of ridges and furrows, running from eye to stem.

FORMS OF PEARS.

It has been remarked that the pyramidal form prevails in pears; but they taper from the eye to the stem, which is just the reverse of the tapering form in apples. Their forms are designated thus—

Pyriform.—When tapering from the eye to the base, and the sides more or less hollowed (concave) (fig. 49).



Figs. 49 to 55.—FORMS OF PEARS.

49, pyriform; 50, long pyriform; 51, obtuse pyriform; 52, obovate; 53, turbinate; 54, oval; 55, round.

Long Pyriform.—When long and narrow, and tapering to a point at the stem (fig. 50).

Obtuse Pyriform.—When the small end is somewhat flattened (fig. 51).

Obovate, or egg-shaped.—Nearly in form of an egg, the small end being nearest the stem (fig. 52).

Turbinate, or top-shaped.—The sides somewhat rounded, and tapering to a point at the stem (fig. 53).

Oval.—Largest in the middle, tapering more or less to each end (fig. 54).

Round.—When the outline is nearly round (fig. 55).

FORMS OF PEACHES.

There is too much uniformity in the forms of peaches to render the adoption of any set of terms descriptive of them very serviceable. They are mostly *round*, occasionally approaching to *oblong* and *oval*; the sides are frequently compressed, flattened, exhibiting a *suture* or furrow, running from the point to the base; the width, depth, etc., of this suture are, in many cases, peculiar, or at least worthy of note.

FORMS OF PLUMS.

Plums are *round*, *oval*, or *oblong*, as the peach, and marked, in some cases, by a similar flattening of the sides, and by the suture.

FORMS OF CHERRIES.

Cherries are *round* or *heart-shaped*; *obtuse heart-shaped*, when too round to be fully heart-shaped; and *pointed*, when the point is more than ordinarily sharp, or peaked. The suture is also taken note of, as in plums and peaches.

Gooseberries and *Grapes* are always round or oval. *Currants*, always round. *Strawberries*, round, conical or oval, sometimes with a neck; that is, the base is drawn out at the stem in the form of a narrow neck. *Raspberries* are conical, roundish or long.

3d. *Color*.—The color of fruits depends much on their exposure to the sun's rays. We find that in orchard trees, where the heads are dense, and a large portion of the fruit shaded and shut out from the sun, there is a great difference in the color; indeed, so great, frequently, as to make their identity, from appearance, quite doubtful. Varieties

that are naturally—when properly exposed to the sun—of a bright red or a glowing crimson, remain green in the shade. The climate, too, seems to have considerable effect on the color. As a general thing, we observe that northern apples are clearer and brighter colored than those of the South.

Dry soils and elevated situations produce more highly colored fruit than damp and low valleys. The terms used in describing colors are all simple, and well understood.

4th. *Flavor*, in table fruits, is one of the most important of qualities; for, however large or fair a fruit may be, if insipid or astringent to an unpleasant degree, or if it possesses some other disagreeable quality, it is unfit for the table. There are various kinds of flavor even among varieties of the same species: in pears, particularly, it is almost endless; the shades and degrees of *sweet* and *acid*, and the various perfumes that mingle with these, are almost infinite.

The same circumstances mentioned as favorable to high and brilliant coloring, are also favorable to the production of fine flavor. *Light*, *heat*, a *dry soil*, and *moderate growth*, seem to be all essential to fine flavor. On trees somewhat advanced in age, fruits are apt to be higher flavored than on young trees that have just commenced bearing, and in a dry than a wet season. The philosophy of all this is, that in a damp soil or season, or in a shaded situation, when trees are young, and growing rapidly, the fruit receives more sap from the tree than can be properly elaborated by the action of the sun and atmosphere on its surface, and, consequently, the sugary principle is produced in small quantities—the juice is watery, sour, or insipid, as the case may be.

The various terms by which flavor is designated, such as *sweet*, *acid*, *subacid*, *sprightly*, *perfumed*, *musky*, *spicy*, etc., are all well understood.

SECTION 8.—THE SEED.

The perfect seed contains the rudiment of a plant of the same nature as that which produced it. This rudiment of the new plant is called the *embryo*, and is found in a more or less developed state in all seeds. In fig. 56 is given an enlarged view of an apple seed cut longitudinally to show the embryo in place, and fig. 57 shows the embryo of the same after germination, the lettering referring to the same parts in both illustrations. It consists

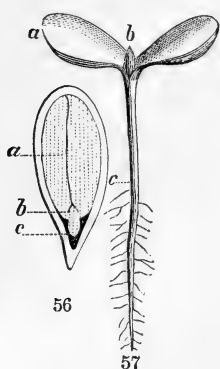


Fig. 56, apple seed divided:
Fig. 57, germinating seed.
a, cotyledons; *b*, plumule;
c, radicle.

of three parts—the *cotyledons* (*a*, figs. 56 and 57), which are the first pair of leaves, usually rudimentary; these are the parts that first make their appearance, and are known as seed leaves. The bases of these cotyledons are united to the *radicle*, (*c*), and between them is a bud (*b*), called the *plumule*. The radicle and plumule are very inconspicuous in the seed (fig. 56), but as soon as the seed is excited into germination by the heat and moisture of the earth, the *radicle* elongates, one end penetrates the soil, and roots soon start from it, and the upper

portion ascends in an opposite direction, bearing the plumule, and, in the apple, etc., the cotyledons to the surface, where they find the necessary air and light. The plumule, which is really a terminal bud, is soon lifted up by the development of a section of stem, unfolds its leaves, and exposing another bud, which in its turn repeats the same process, and thus the growth of the tree goes forward.

It has been remarked that a seed contains the rudiments of a plant similar to that on which it is produced; but

this needs some explanation. In distinct *species*, this will be true; but the seeds of *varieties* that have been produced by culture and hybridizing, seldom, or never, reproduce exactly their like, hence the necessity for the various artificial methods of multiplication, such as grafting, budding, layering, etc. It is to these operations that we are indebted for the preservation of varieties that were originated hundreds of years ago.

Germination.—Heat and moisture, air, and the exclusion of light, are all necessary to the healthy and perfect germination of seeds. It may be well to consider, briefly, the part which each of these has to perform.

1st. *Moisture*.—If seeds are sown in a time when the ground is parched, they will show no signs of germination until it is, in some way or other, moistened. The quantity of moisture necessary to a seed depends on the nature of its covering, and its size. A small seed, with a thin covering, will vegetate much sooner, and with less moisture, than a large seed, with a hard, bony covering. The moisture must, in the first place, soften the covering, penetrate to the mealy part of the seed, and prepare it for the chemical changes necessary to convert it into food for the embryo plant. If apple or pear seeds be kept in a dry, warm room all winter, they will not be likely to vegetate the succeeding spring, but if sown, will probably lie in the ground all summer, and possibly germinate the spring following. If cherry seeds are kept dry for any length of time, say two or three months, they will not germinate the season following; and peaches and plums have actually to be in the ground all winter to insure their germination the succeeding spring. Seeds will germinate much quicker when freshly gathered than after they have dried, because heat, moisture, and air have easier access to them, and act more quickly on them. These facts, of which all are well aware, show the necessity for moisture, and the nature of its influence.

2d. *Heat* is the next most important element. Seeds do not grow in winter. We sow our apple, pear, peach, and plum seeds in November, but they show no signs of germination until a change of season. When the warmth of spring penetrates the soil, it reaches the seed, and, in connection with the moisture already imbibed, induces chemical changes, which excite the vital energies of the germ, decompose the mealy part of the seed, and prepare it for the temporary nutrition of the young plant.

3d. *Air*.—Although seeds may have heat and moisture in the requisite proportions, still it has been proved, by many experiments, that without air, germination cannot take place.

Practical cultivators are aware that seeds planted too deeply do not grow; many kinds will lie buried in the ground for years without growing, and when turned up near the surface, will germinate immediately. It is the *oxygen* of the air that constitutes its importance; it produces, by forming new combinations with the constituents of the seed, that chemical process which converts the starch into gum and sugar, as we observe in ordinary cases of fermentation.

4th. *Exclusion of Light*.—The manner in which self-sown seeds in the forest are covered with fallen and decaying foliage, plainly indicates that nature never intended the light to strike germinating seeds. A seed entirely exposed would be at one time saturated with moisture, and at another parched with drouth; chemical changes would be alternately promoted and checked, until the vital principle would be destroyed, or so weakened as to produce a feeble and worthless plant. The depth of the covering should always be regulated by the size of the seeds. Small and delicate seeds may be sown almost on the surface, whilst large ones may be imbedded to the depth of four or five inches. The small seed requires little moisture, and has but a feeble force to penetrate an

earthy covering ; but the large requires much moisture, and has force enough to push its way up.

CHAPTER II.

SOILS.

SECTION 1.—DIFFERENT KINDS OF SOIL.

Soils are usually designated by terms expressive of the predominant material in their composition ; thus we hear of *sandy*, *loamy*, *gravelly*, *clayey*, *calcareous*, or *limy*, and *alluvial* soils.

A *sandy soil* is that in which sand is the principal ingredient. Such soil is usually quite defective. It is so porous, that it parts almost instantaneously with moisture, and plants in it suffer from drouth. All the soluble parts of manures are also quickly washed out of it, and hence it requires continual additions to produce even a scanty growth. The great point in improving it is to render it more retentive by the addition of clay, ashes, etc.

A *clayey soil* is that in which clay predominates. It may be considered the opposite of sandy, inasmuch as its defects are, that it retains moisture too long, is too adhesive ; in dry weather it becomes as hard as a burnt brick, impervious to dews or light showers, and when thoroughly saturated with wet, it is tough, and requires a long time to dry. No fruit tree succeeds well in such a soil ; but it is capable of being improved and fitted for many species, and especially the plum and the pear. The obvious way to improve it is, by incorporating with it sand, muck, or leaf mould.

A *gravelly soil* is one made up in greater part of small stones, pebbles, decomposed rock, etc.; such soils, as a general thing, are unfit for fruit trees, unless great labor is incurred in trenching, deepening, and mixing with clay, muck, etc., of opposite characters.

A *loamy soil* is one we hear a great deal about, and may be understood in various ways. It may be considered a mixture of equal parts of sandy, clayey, and vegetable soil. It is neither so light as the sandy, on the one hand, nor so tenacious as clay on the other; and, as a general thing, contains such elements, and is of such a texture, as to render it eligible for all ordinary purposes of cultivation, and especially so for fruit trees. Loamy soils are spoken of as *sandy loams* when sand forms a large ingredient—say one-half of their composition; *gravelly*, when pretty largely mixed with small stones; *calcareous*, when lime is found in them.

Calcareous soils have a large amount of lime mixed with the other ingredients of which they are composed. All the lands in limestone districts are of this character, and, as a general thing, are well adapted to fruit culture.

Peaty soil consists chiefly of vegetable mould from decayed marsh plants, in low, wet places. It is unfit, in itself, for fruit trees, but is valuable for improving both light and heavy soils.

Alluvial soils are made up of decomposed vegetable substances, the sediment of rivers, and materials washed down from neighboring hills; the valleys of all our rivers and streams are composed of this, and it is the richest of all soils. Fruit trees in such soils make a rank, vigorous growth, but they are not so hardy nor so fruitful, nor is the fruit so high flavored as on soils with more sand, clay, or gravel, and less vegetable mould.

In treating of the different classes of fruits, we shall refer to the particular soils best adapted to them.

SECTION 2.—DIFFERENT MODES OF IMPROVING SOILS.

In regard to depth, soils vary materially, some being not over eight or ten inches in depth of surface, others a foot, while in deep alluvial valleys they are often two feet. For orchard and garden purposes, a *deep soil* is quite essential, to enable the roots to penetrate freely in search of food, and to enable them to withstand the demands of protracted drouths. Few soils in their ordinary condition of farm culture are, in this respect, suitable for trees. Even where naturally deep and loamy, if the upper part only (say to the depth of six inches, which is as deep as most people plow) be in a friable condition, it cannot be considered as in a proper state for the reception of trees, for their roots cannot be confined to six inches of the surface. Some means of loosening and deepening must be resorted to, and what are they?

1. SUBSOIL PLOWING.

This is the cheapest and best method, where a large quantity of ground is to be prepared for extensive planting. The common plow goes first, and takes as deep a furrow as practicable. The subsoiler follows in the same furrow, and loosens, without turning up, the lower part of the surface, and a part of the subsoil. Except in cases where the subsoil is a very stiff clay, or a hard gravel, and near the surface, the two plows can go to the depth of eighteen or twenty inches. This is our mode of preparing nursery grounds. If a single plowing in this way does not accomplish the desired end, a second may be given, going down still deeper.

We had a piece of soil, the surface of which was about a foot deep, of black vegetable mould, with a slight admixture of sand, resting on a stiff clay subsoil, which prevented the water from passing off. In this condition

we found it entirely unfit for trees; we subsoil plowed it six or eight inches deep, turning up the clay subsoil, and mixing it with the surface; we also drained it, and spread over the surface the clay that came out of the drains, and in this condition we find it producing the finest trees, especially apples, pears, and plums. The soil is more substantial, and the surface water passes off freely.

2. TRENCHING.

In gardens, too limited in extent to admit of plows, or where it is desired to make the soil thoroughly and permanently deep, trenching is the means.

The spade is the implement used in this operation. A trench, two feet wide, is opened on one side of the ground, and the earth taken out of it is carried to the opposite side. Another trench is opened, the surface spadeful being thrown in the bottom of the first, and the next lower on the top of that, and so on until it is opened the required depth, which, for a good fruit garden, should be about two feet. If the subsoil be poor and gravelly, it is better to loosen it up thoroughly with a pick, and let it remain, than to throw it out on the surface. When the whole plot is trenched over in this way, the earth taken out of the first trench will fill up the last one, and the work is done. If the soil be poor, a layer of well-decomposed manure may be added alternately with the layers of earth; and if the soil be too light and sandy, clay, ashes, etc., can be added; and if too heavy, sand, lime, muck, peat, scrapings of dead leaves from the woods, or any other material calculated to render it porous and friable. If a garden is thus trenched in the fall or winter, and then turned over once in the spring, to effect a thorough mixture of all the materials, it will be in suitable order for planting. This is something like the way to prepare soil for a garden; and let no one say it is too troublesome or too expensive;

for, in two years, the extra pleasure and profit it will yield will pay for all. Nothing is so expensive nor so troublesome as an ill-prepared soil.

3. DRAINING.

There is a false notion very prevalent among people, that where water does not lodge on the surface of a soil, it is "dry enough." However this may be in regard to meadows or annual crops, it is quite erroneous when applied to orchards or fruit gardens. *Stagnant moisture*, either in the surface or subsoil, is highly injurious—ruinous to fruit trees. In such situations, we invariably find them unthrifty and unfruitful, the bark mossy, and the fruit imperfect and insipid. All the soils, then, not perfectly free from stagnant moisture, both above and below, should be *drained*. In draining, it is, of course, necessary to have a fall or outlet, for the water. Having selected this, the next point is to open the drains. We usually make them three feet deep, and wide enough to give sufficient room to work—say three feet wide at top, narrowing gradually to six inches at the bottom, which should be even, and sloping enough to the outlet of the water to enable it to run. Draining plows are now used advantageously, lessening very much the expense of opening the drains. The plow is constructed something like the subsoiler, and the horses are attached with a long even, so that one can walk on each side of the drain.

A sufficient number of men follow the plow to throw out the earth with shovels as fast as it is loosened.

The two-inch pipe tile is the best for common drains. For outlet drains, the size must be proportioned to the number of small drains which discharge into it.

Those who have much draining to do, and need information on the subject, should procure a work upon the subject.

Where draining tiles are not to be had conveniently, small stones may be used. The bottom of the drain should be filled with them to the depth of eight or ten inches. In using these, the drains require to be at least six inches deeper than for tiles, in order that a sufficient quantity of stones can be used without coming too near the surface. Some brush, or turf, with the grassy side downwards, should be laid on the stones before filling in the earth, to keep it from filling up the crevices.

Objections are sometimes made to draining for orchards on the ground that the roots may get into the drains, and fill them up. This difficulty is obviated by placing the rows of trees at a proper distance from the drains.



CHAPTER III.

MANURES.

SECTION 1.—IMPORTANCE OF MANURES.

No soil, whatever may be its original fertility, can sustain a heavy and continued vegetation for many years without becoming, to some extent, exhausted. Indeed, there are few people so fortunate, except those who settle upon new, uncultivated lands, as to procure a soil that does not need manuring to fit it for the first planting with trees. It is, then, a matter of importance for every man, who has more or less land to cultivate, to inform himself well on the subject of saving, preparing, and applying manures. In this country, the only class of men, generally speaking, who can be properly said to collect and manage manures with system and care, are nurserymen and market gardeners near our large towns. It is very

seldom that people generally give the matter a thought until garden-making time comes around in the spring, and then anything in the form of manure is carried into the garden, and applied whether fit or unfit. This is not the proper course.

Every garden should have its manure heap, that, in the fall or spring, when it comes to be applied, will cut like *paste*. In that state only is it safe to apply it. All parts of it are then decomposed thoroughly; all seeds of noxious plants are dead, and it is in a condition capable of yielding at once, to the roots of growing plants, healthy nutrition, that will produce a *vigorous, firm, sound, and fruitful growth*; and this is precisely what is wanted: far better to have a tree starved and stunted, than forced into a rank, plethoric growth, with crude, ill-prepared manures.

SECTION 2.—PREPARATION OF MANURES.

The best gardeners pursue a system something like this: A trench is prepared, two or three feet deep, and large enough to hold what manure may be wanted. In the bottom of this trench, a layer of muck, grassy turf, ashes, anything and everything capable of being decomposed, is laid down, say a foot deep. On the top of this, a thick layer of stable or barn-yard manure, two or three feet deep, then another layer of muck, gypsum, etc. In this way it remains until more manure has accumulated around the stables; it is then carried and deposited in another layer, with a layer of the other materials on the top. The manure should always be saturated with moisture, and trodden down firmly to hasten its decay; and if an occasional load of night soil could be mixed in with it, all the better. The layer of muck and other substances being always placed on the top of the last layer of manure absorbs the evaporations of the heap, and hastens

the decay of all. When stable manure is thrown down and left uncovered, a dense steam will be seen to rise from it; and this is the very essence of it escaping to be lost; and if it be thrown down in a heap *dry*, it will immediately burn—that is, dry rot. Its enriching ingredients all pass off by evaporation, and there is nothing left but its ashes, so to speak.

When the heap has accumulated for four or five months, as described, the whole should be turned over, completely mixed, and piled up in a compact, firmly trodden mass, when it will undergo further decomposition, and, in a short time, become like *paste*. Adjoining every manure heap there should be an excavation, to receive its liquid drainage, in order that it may be saved, and either applied, in the growing season, in a liquid state, diluted with water, or be thrown over the heap.

“Special manures” have been much talked of lately. By the word “special,” is meant a particular quantity, of a particular mixture, for certain species, and even for certain varieties of fruits. Nearly all the suggestions on the subject are speculative, and unreliable. The subject is an important one, but we want direct and careful experiments. It is only when we know to a certainty what material certain trees need most of, and in what degree it abounds, or is wanting in our soil, that we can apply it safely. The experience of farmers and gardeners, grain and fruit growers, all over the world, affords undoubted evidence of the enriching qualities of *stable manure*. On all soils, and for all sorts of crops, it is an unfailing and powerful fertilizer; and we make it the base of all our manure and compost heaps. By mixing with it the ingredients we have mentioned, we hasten its decay, save its parts from waste, and, at the same time, combine with it other substances that will not only enrich, but improve the texture of soils, and increase the supply of the mineral substances required by plants. Dr. Daubney, a distin-

guished writer on the character and improvement of soils, etc, says: "Fortunately, we are provided, in the dung of animals, with a species of manure of which the land can never be said to tire, for this simple reason—that it contains within itself not *one* alone, but *all* the ingredients which plants require for their nutrition, and that, too, existing in the precise condition in which they are most readily taken in and assimilated." But a good substitute for this article, where it cannot be obtained, is an important point. Some time ago, we noticed in the report of a discussion on manures in Boston, that the Hon. M. P. Wilder, one of the most distinguished horticulturists in America, stated that he had found the following compost equal to stable manure for gardening purposes generally, and for fruit trees.

"One cord of meadow muck, having been exposed to the action of the air and frost at least one year; twelve bushels leached ashes; six bushels crushed bones. This mixture cost him at the rate of \$4.50 cents per cord. Latterly, he added to this his stable manure, and about an eighth of the whole bulk of fine refuse charcoal from the depot of venders, which was delivered to him at \$5 per cord; and in this way he found it the best, as a general manure, he had ever used. On fruit trees its effect was remarkable.

"In the spring of 1847, he planted a square in the nursery with imported trees from England, this compost having been spread and plowed in. These trees were from four to five feet in height, and although it is not usual for trees to make a large growth the first year, they acquired branches of three to four feet.

"In June last, which is very late to set out trees, he prepared another square on rather poor land, and planted trees just received from England upon it. The soil had been thrown up to the frost the previous winter, and the compost here was applied in the trenches, near the roots.

Mr. Wilder exhibited two shoots which had grown from those trees since they were set, in June. The shoots were four feet in length, and the wood hard, and well ripened."

In addition to all these sources for manure, it may be added that fallen leaves, scrapings of streets, weeds, wood chips, sawdust, the ashes of all prunings of trees and brush, soot, blood, animal flesh, soap-suds, and slops from the kitchen, and, in fact, everything decomposable may be used to increase the bulk of the manure heap, taking care that everything likely to waste by evaporation be covered at once with muck, charcoal, or some material calculated to absorb the gases evolved by decomposition. We very frequently see people, in the spring of the year, when their garden is undergoing a purifying and fitting up process, carry to the highway all the brush, dry stems of plants, and all the wreck of the previous season's work, there to make a bonfire to get it out of the way, while at the same moment they complain sadly of the lack of manure.

There was no such thing as a manure heap on the premises.

SECTION 3.—MODES OF APPLYING MANURE.

Where an acre or several acres of ground are to be prepared for trees, the better way is to spread the manure over the surface, and turn it in with the plow. When it is scarce, and economy necessary, it may be applied around the roots, by mixing with the earth at planting time.

Quantity to be Applied.—This, of course, depends on two things—the necessities of the soil, and the quality of the manure. If the land be poor, an even covering of two or three inches should be given; if in tolerably good condition, one inch will be sufficient. One inch of well-

decomposed animal manure will be equal to three inches of a partially decayed compost.

SECTION 4.—LIQUID MANURE.

Manure, in a liquid state, has these advantages to recommend it: It can be applied to trees and plants in a growing state without, in the least, disturbing the surface of the soil, and it supplies, at the same time, both nutriment and moisture. It can be applied to bearing trees, strawberries, etc., *in fruit*, if defective in vigor, or suffering from drouth, and yield an immediate sustenance, that will enable them to produce much larger and finer fruit than they could have done without it.

It may either be collected in a tank, kept on purpose near the barns, or it may be made when wanted by dissolving manure in water. It may be much stronger for trees, the roots of which are a considerable distance from the surface, than for such plants as have their roots near the surface. It is the only prompt and effectual stimulant for trees on a poor soil, to enable them to perfect their crop. We have frequently witnessed its astonishing effects. It should be applied in the evening, and in such quantity as to penetrate to the roots; half a dozen waterings will be sufficient in most cases, but it is better to apply it well diluted, and often, than a smaller quantity, too strong. A dozen shovelfuls of animal manure will make a barrel of liquid powerful enough for most purposes; and if pure liquid soakage of the manure heap or urine of animals is used, at least one-half rain-water should be added. Soap-suds forms an excellent liquid manure for all trees. The grape-vine is especially benefited by liberal and frequent application.

CHAPTER IV.

THE DIFFERENT MODES OF PROPAGATING FRUIT TREES.

General Remarks.—The propagation of fruit trees may be classed under two principal heads—the *Natural*, which is by *seeds*; and the *Artificial*, by the division of the *plants*, as in *cuttings*, *layers*, *suckers*, *buds*, and *grafts*.

PROPAGATION BY SEEDS.

Seedling fruit trees are propagated either to obtain new varieties, or stocks for budding or grafting. It is only where the very rudest system of fruit culture is practised—as, for instance, in newly-settled countries—that seedlings are planted out to bear, for the reason that, unless in very rare instances, varieties worthy of cultivation do not reproduce themselves from seed. The important differences that exist between the seeds of different classes of fruit trees render it necessary to treat of each separately; their management will therefore be given in detail, in connection with the propagation of stocks.

There are some points, however, of general application, that may be considered here with propriety. It scarcely admits of a doubt, but that many of the difficulties met with in fruit tree culture, as maladies of various sorts, unfruitfulness, etc., are induced by a careless and indiscriminating system of propagation.

The stock has a most important influence on the health, longevity, fruitfulness, and symmetry of the tree, and should therefore be propagated and selected with due regard to its soundness, vigor, and hardiness of constitution.

If it were possible, seeds, to grow stocks from, whether of the apple, pear, peach, plum, or any other, should be taken only from healthy, vigorous trees, and from perfect,

well-matured fruits. This is more especially important in the case of the peach, which, in some sections, is affected with a fatal malady, known as the "yellows."

In the case of the plum, too, care should be taken not to grow stocks from the seeds of trees affected with that well-known fungus disease, called "black-knot."

I have strong reasons for believing that stocks grown from trees affected with this disease will soon fall a prey to it. Indeed, I have seen it make its appearance among seedlings during their first season's growth in the seed-bed.

As this disease is now so prevalent, I would recommend the total rejection of American seedlings unless grown from seed positively known to be the product of sound trees. It is safer to import stocks from Europe, where the plum-tree is exempt from the black-knot.

In regard to other stocks, as the apple, pear, cherry, etc., usually grown from seed saved promiscuously, the greatest care should be taken to select and plant out, for budding or grafting upon, only such as show unmistakable signs of health and vigor; all others should be discarded. The strongest stocks come from the sound and healthy seed, and it is a pretty safe rule to discard the small ones.

A discriminating spirit is already becoming apparent among the best classes of cultivators, and their example will soon be felt. The selection of seeds for stocks is a point of more than ordinary importance, and merits the special attention of every man engaged, to whatever extent, in the propagation of fruit trees.

Production of New Varieties.—New varieties are produced from seeds that have been properly hybridized, as described in the article on hybridization, or from seeds of the best specimens of the best varieties.

Where it is desired to obtain seedlings of a particular variety, free from any crossing with others, the flowers

should be protected while in blossom, to guard them against foreign impregnation ; seeds should be saved only from large, perfect, fine flavored specimens, and the seeds themselves should be plump and mature. Sometimes a good variety is obtained by selecting from beds of seedlings, such as possess marked evidences of improvement ; *vigorous, luxuriant growth, large, heavy foilage, prominent buds, and smooth, thornless wood.* These characters indicate superiority, but do not always ensure superior fruit. The stock is supposed to exert considerable influence on the seed ; and if this be the case, it would be well to get such varieties as we wish seeds from, on their own roots, by layering, or grafting on roots in the ground, so that the graft will, itself, strike root. Mr. Knight's mode, of obtaining seedlings of the best varieties, was to prepare stocks from some good sort that would strike from cuttings. These stocks he planted in rich, warm soil, and grafted with the kind he wanted the seeds from. The first season after grafting he took them up, reduced the roots, and planted again. In this way he had them bear fruit in two years. He allowed only a couple of specimens to remain on each tree, and these, consequently, were very large, mature, and every way fine, and from these the seeds were taken. Seedlings may be tested quickly, by budding or grafting them on bearing trees. We may fruit apples and pears in this way in four or five years, whilst ten or fifteen would be necessary on their own roots.

2. *By Division of the Plants.*—It has been remarked, in the article on buds, that every bud is capable, under favorable circumstances, of producing a new individual, similar to that from which it is taken.

Hence it is, that out of the young annual wood of an apple, pear, peach, or any other fruit tree, we frequently make several hundreds. Every good, well-formed bud, properly separated, and inserted under the bark of the individuals of the same, or a closely allied species, will, in

one year from its insertion, or with one season's growth, have become a new tree. It is by these means we are enabled to disseminate new varieties with such wonderful rapidity. If a young tree, of a new variety, will make half a dozen shoots the first season, each bearing half a dozen buds, we can, if we have stocks to bud on, be in possession of thirty trees of that variety in two years from the time we obtained one tree, and in another year we may have four times that number. The production of a tree from a *bud*, a *graft*, a *layer*, or a *cutting*, is but the same thing, effected by different means. In all the cases, a part of the parent plant, with one or more buds attached, is separated from it. The *cutting*, sometimes composed of one bud, or joint, and sometimes of several, we put directly in the ground, where it forms roots. The graft is a cutting inserted, not in the ground, but in the wood of another plant, to which it unites. The bud inserted under the bark of another tree, and the one buried in the ground, differ only in this, that one draws its support directly from the soil, and the other indirectly, through the tree to which it unites.

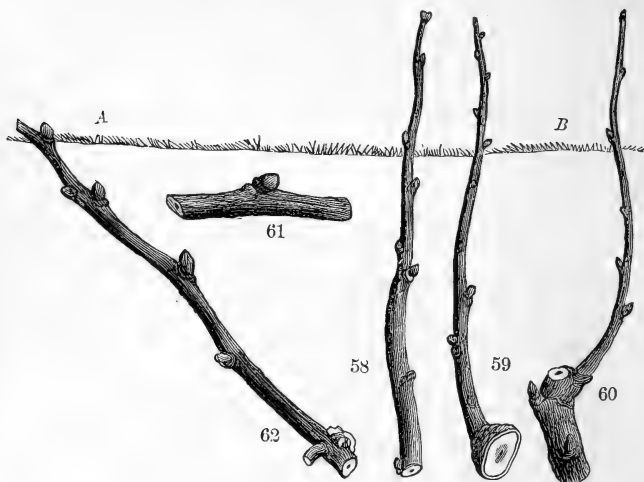
SECTION 1.—PROPAGATION BY CUTTINGS.

A cutting is a shoot, or part of a shoot, generally of one season's growth. The length of the cutting varies from a single eye, or joint, to a foot, according to the nature of the species, or the circumstances under which it is to be grown. The wood should be as stout and mature as possible, and should be cut close and smooth to a bud at both ends (fig. 58). In all cases, cuttings taken off close to the old wood, with the base attached, as in fig. 59, are more successful than when cut at several joints above; and in many cases, as in the quince, for example, an inch or two of the old wood left attached to the base of the cutting, as in fig. 60, render it still more certain of suc-

cess. The more buds we can get around the base of a cutting, the better, other things being equal; for these buds, as soon as they become active, send down new matter, from which the roots are emitted.

Cuttings of the grape are sometimes made of a single eye (fig. 61), with an inch or so of wood above and below it.

The *time to make cuttings* is in the fall, as soon as the



Figs. 58 to 62.—CUTTINGS.

58, a cutting, all of young wood; 59, a cutting, with a heel of old wood; 60, a cutting, with 2 or 3 eyes of old wood; 61, a cutting of a single eye of the grape vine; 62, a long cutting of the grape; line A, B, surface of the ground.

wood is ripe, and through the early winter months. It should not be deferred later than January. The *soil for cuttings* is of the greatest importance to their success, for if, on the one hand, it be cold, damp, and compact, they will decay, and if too loose and sandy, they will dry up for the want of sufficient moisture. A soil so mellow that it cannot bake, and yet so compact as to retain humidity enough to support the cuttings until new roots are formed, seems to be absolutely necessary—such a soil as we may

suppose a good garden border to be composed of. Rooted plants can endure extremes, but cuttings require the most favorable circumstances.

Time to plant.—The fall would be the better season to plant all cuttings, if we could cover them so as to prevent the frost from heaving them out. It is on account of this difficulty that we plant, from necessity, in the spring; but spring planting must be done very early, that vegetation may proceed gradually. If late planted, warm weather comes on them at once, before they have formed roots sufficient to support the demands of the young leaves. Where only a few are grown, shading might, at certain times, be given, and some light substance, like sawdust, be spread about them, to preserve an even temperature and humidity, or they might be put in a cold-frame, where they could receive any required attention. Where acres of cuttings are grown, these things are not practicable.

Depth to plant.—As a general thing, cuttings should be inserted so deep, that only two buds will be above the surface of the ground, and in the vine only *one*. If cuttings are long, they need not be set perpendicularly, but sloping, so as to be within reach of heat and air. A cutting of a single eye of the vine, with a piece of wood attached, must be entirely covered—say half an inch deep; see figures 58 to 62, ground line, *A*, *B*. But such cuttings are seldom planted, except in pots, in houses, or in hot-beds.

Preserving Cuttings.—If cuttings are not planted in the autumn, they should at least be prepared quite early in the winter, and be buried in the earth, out of doors, in a pit. A mound of earth should be drawn up over the pit to throw off water. At the very first favorable moment in the spring, they should be planted. Trenches are opened as deep as necessary with a spade, and the cuttings set in it at the proper distances, from three inches

to a foot, according to circumstances. When the cuttings are in the trench, the earth is partly filled in, and trod firmly down with the foot, then the balance is filled in and leveled up.

Cuttings require particular attention in the way of weeding and hoeing; if weeds grow up thickly, and appropriate the moisture of the ground, or if the surface be allowed to crack, as it may, after rains, if not quite sandy, they will either make a feeble growth or fail entirely. The ground wants repeated stirring to keep it friable and perfectly free from weeds.

SECTION 2.—PROPAGATION BY LAYERING.

A layer is similar to a cutting, except that it is allowed to remain in partial connection with the parent plant until it has emitted roots. On this account, layers are much more certain than cuttings. It is the surest and most simple method of propagating the *Grape* and the *Gooseberry*, and also the *Quince*, *Paradise*, and *Doucain*, for stocks. It may be performed in the spring with shoots of the previous year's growth, before vegetation has commenced, or in July and August, on wood of the same season's growth. The ordinary mode of doing it is, first, to spade over and prepare the ground in which the branch is to be laid, in order to make it light and friable. The branch is then brought down to the ground (fig. 63); an incision is made at the base of bud, *A*, through the bark and partly through the wood; the knife is drawn upward, splitting the shoot an inch or two in length, and the branch is laid in the earth with the cut open, and kept down by means of a crooked or hooked wooden peg, *B*. The earth is then drawn in smoothly around, covering it two or three inches deep; and the end of the shoot that is above ground is tied up to a stick, *C*, if it requires

support. In the *Grape*, *Gooseberry*, or *Currant*, a simple notch below a bud is sufficient, and they will root if simply pegged down; but roots are formed more rapidly when the shoot is cut one-third through, and slit as described.

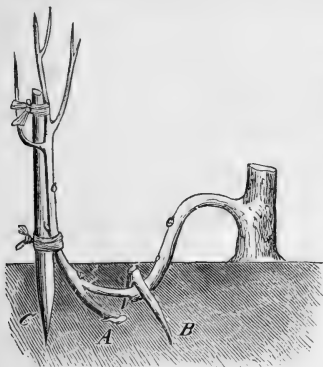


Fig. 63.—A COMMON LAYER.

A, the incision; B, hooked peg;
C, stake.

A long shoot of the vine may be layered at several points, and thus produce several rooted plants in the course of one season. This is called *serpentine layering* (fig. 64). The *Quince*, *Paradise*, and *Doucín* stocks, where raised in large quantities, are propagated in a different way from that de-

scribed. The process requires much less labor; and where plants root so freely as they do, it answers every purpose.

We will take a plant of the quince, for example, and, in the spring, before growth commences, we cut it down nearly to the ground, leaving four or five buds at its base (A, fig. 65). During that season, a

number of vigorous shoots will be made. The following autumn or spring the earth is drawn up around the base of the

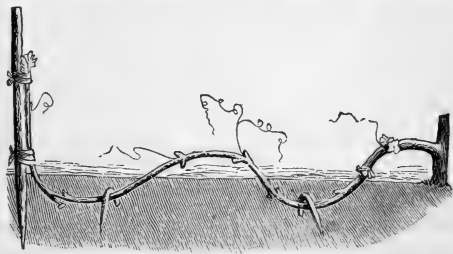


Fig. 64.—SERPENTINE LAYER.

plant, so that the crown, where it was cut, will be covered, and, consequently, the base of all the shoots for several

inches in height. During the next summer's growth, every branch is sufficiently rooted to be separated and placed in

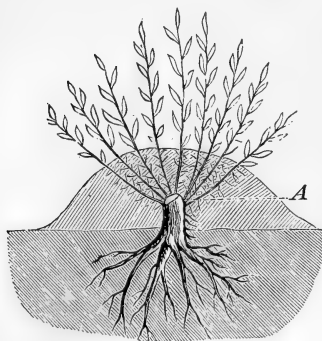


Fig. 65.—MOUND-LAYERING OR BANKING-UP.

A, the point at which the mother plant was cut back.

nursery rows the following spring. This is the way to obtain *strong* stocks; for the cutting back of the mother plant produces very vigorous shoots the first season, and when another season's growth is added, they are as strong as can be desired. We succeed in rooting these shoots the first season of their growth by earthing them up about mid-summer; but they are not quite strong enough, or sufficiently rooted, for transplanting and budding the following season.

SECTION 3.—PROPAGATION BY SUCKERS.

Suckers are shoots sent up from the roots. We observe them most frequently around trees that have had their roots wounded by the spade or plow. The wounds induce the formation of buds, and these buds send up shoots. They are occasionally used from necessity for stocks, but should not be employed where seedlings can be obtained. Occasionally, we find certain varieties of plum throw up fine vigorous suckers, that would make excellent stocks if taken off with good roots; but their tendency to produce suckers renders them exceedingly annoying in gardens, and, on this account, objectionable. The roots of the raspberry are full of buds, and, consequently, throw up great quantities of suckers, and the smallest cuttings

of the roots will grow. Suckers, of any plants, that can easily be propagated by cuttings or layers, should never be used.

SECTION 4.—PROPAGATION BY BUDDING.

This operation is performed during the growing season, and usually on young trees from one to five years old, with a smooth, soft bark. It consists in separating a bud, with a portion of bark attached, from a shoot of the current season's growth of one tree, and inserting it under the bark of another. When this bud begins to grow, all that part of the stock above it is cut away, the bud grows on, and eventually forms a tree of the same variety as that from which it was taken. Buds may be inserted in June, and make considerable growth the same season, as they do in the South, but, as a general thing, this is not desirable in the propagation of fruit trees. The ordinary season in the Northern States is from the middle of July until the middle of September, and the earliness or lateness at which a species is budded depends, other things being equal, on the condition of its growth.

Those accomplishing their growth early in the season are budded early, and those that grow until the autumn are budded late. Thus the season extends over a period exceeding two months. In all cases, the following conditions are necessary :

1st. *The buds must be perfectly developed in the axils of the leaves on the young shoots* intended to bud from. This is seldom the case until the shoot has temporarily ceased to lengthen, as indicated by the perfect formation of its terminal bud.

If buds are wanted before this condition naturally arrives, their maturity may be hastened very much by pinching the tips of the shoots. In ten or twelve days after the pinching of a very soft shoot, its buds are fit for working.

2d. *The bark must raise freely from the stocks to be budded.* This only happens when the stocks are in a thrifty and growing state. Trees that accomplish most of their growth early in the season, must be watched and budded before they cease to grow; those that grow very late must not be budded early, or the formation of new wood will surround and cover the buds; in gardener's language, they will be "drowned by the sap."

The *implements* needed are a *pruning-knife*, to dress the stocks by removing any branches that may be in the way of inserting the bud; and a *budding knife*, to take off the buds and make the incisions in the stock. The latter should have a very thin, smooth, and keen edge.

Strings for tying in the buds are either taken from bass mats, or they are prepared from the bark of the basswood. We always prepare our own; we send to the woods and strip the bark off the trees in June; we then put it in water from two to three weeks, according to the age of the bark, until the fibrous, paper-like inner bark can be easily separated from the outer, when it is torn into strips, dried, and put away for use.

Cutting and Preparing the Buds.—Young shoots, in the condition described, are cut below the lowest plump bud; an inch or two of the base of every shoot, where the buds are very close together, and quite small, should be left. The leaves are then stripped off, leaving half of each leaf-stalk to handle the bud by, as in fig. 63.

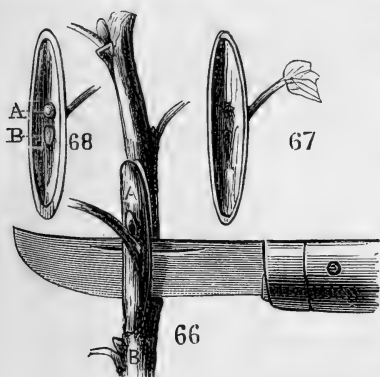
Preserving the Buds.—When a considerable quantity is cut at once, they should be stripped of the leaves and wrapped in a damp cloth as soon as cut; and they may be preserved in good order for ten days, by keeping them in a cool cellar among damp sawdust, or closely enveloped in damp cloths, matting, or moss. We often send buds a week's journey, packed in moss slightly moistened; the leaves being off, the evaporation is trifling,

none, in fact, when packed up, consequently very little moisture is needed.

Having the stocks, buds, and implements in the condition described, the operation is performed in this way:

The shoot to bud from is taken in one hand, and the budding-knife in the other; the lower part of the edge of

the knife is placed on the shoot, half an inch above the bud to be removed (*A*, fig. 66); the thumb of the knife-hand rests on the shoot below the bud *B*; a drawing cut is then made parallel with the shoot, removing the bud and the bark, to which it is attached, half an inch above and three-quarters below it. This is the usual length, but it may, in many cases, be shorter. The cut is made just deep enough to be be-

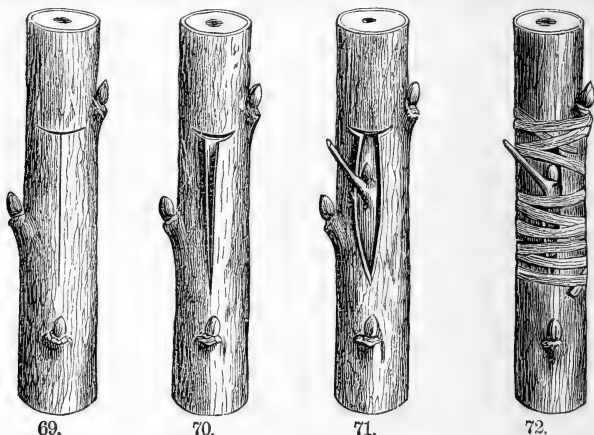


Figs. 66 to 68.—BUDDING.

Fig. 66, a shoot of buds with the leaves taken off, showing the position of the knife in removing a bud. Fig. 67, A bud badly taken off, with a hollow in the center. Fig. 68, A good bud; *A*, root of bud; *B*, root of leaf.

low the bark. A small portion of the wood is always taken off with it, and if this adheres firmly, it should be allowed to remain; if it parts freely, it should be taken out, but in doing so, the *root* of the bud must be carefully preserved, for if it comes out with the wood, the bud is useless. The root of the bud, as it is termed, is a small portion of wood in the hollow part of the inside of the bud. Fig. 67 is a good bud; *A*, root of bud, *B*, root of leaf. Fig. 68 is imperfect, the roots of leaf and bud both out. A smooth place on the stock, clear of branches, is then chosen, where two

incisions are made to the depth of the bark, one across the end of the other, so as to form a **T**, (fig. 69); the bark on the two edges of the perpendicular cut is raised (fig. 70) with the smooth ivory handle of the budding-knife, and the bud is inserted between them (fig. 71); the upper end of the bark attached to the bud is cut square, to fit to the horizontal cut on the stock; the bass string is then wound around tightly, commencing at the bottom, and covering every part of the incision, leaving the bud itself and the leaf-stalk uncovered (fig. 72); the string is fastened above the horizontal cut, and the work is done. The



Figs. 69 to 72.—INSERTION OF THE BUD.

Fig. 69, *A*, stock with the bark slit vertically and across. Fig. 70, the same, with the bark raised. Fig. 71, the same, with the bud inserted. Fig. 72, the same, tied up.

success of the operation, as far as its execution is concerned, depends, in a great measure, on *smooth cuts*, an *exact fit of the bud to the incision made for it*, *secure, close tying*, that will completely exclude air and rain-water, and the quick performance of the whole. The insertion of a bud should not, in any case, occupy more than *a minute*; ordinary practiced budders will set two in

that time, and often two hundred in an hour, with a person to tie. Where the stocks and buds work well, two thousand is not an uncommon day's work in our nurseries, especially of cherries, peaches, and apples. Budding is usually much more successful when performed in moderately dry weather than in wet—the sap being in a condition more favorable for the formation of a union between the stock and bud.

The chief difficulty, experienced by beginners in budding, is the proper removal of the bud. When it happens that the knife passes exactly between the bark and wood, the bud cannot fail to be good; but this rarely happens—more or less wood is attached, and the removal of this is the nice point. Where the buds are flat, the difficulty is less than when they have large, prominent shoulders, as the plum and pear have, in many cases. When all the wood is taken out of these, a cavity remains, which does not come in contact with the wood on which the bud is placed, and therefore, although the bark unites well, the bud will not grow. A little practice will enable the budder to overcome this and all other mechanical difficulties.

SECTION 5.—PROPAGATION BY GRAFTING.

Grafting is the insertion of a cion of one species or variety on the stem or branch of another, which is called the *stock*. Its principal object is the same as budding, to increase certain varieties that cannot be reproduced from seed with certainty; but it is frequently performed with other objects in view. For instance:

To Fruit a New Variety.—A cion inserted in a branch of a bearing tree, will bear fruit perhaps the second year from the graft; but if the same cion had been put on a young seedling, it would not have borne in ten years.

One *species* is frequently grafted with success upon

another, by which certain important modifications are wrought upon both the size and fruitfulness of trees, and the quality of the fruits. Thus, we can graft, in many cases, with highly beneficial results, the peach and apricot on the plum, the pear on the quince, strong-growing species and varieties on weaker ones, and *vice versa*. But experience has established the fact, that there must be, between the stock and graft, a close alliance. We cannot graft an *apple* on a *peach*, nor a *cherry* on a *pear*; but the pear, the apple, quince, medlar, thorn, and mountain-ash—a naturally allied group—may, with more or less success, be worked upon one another.

The French horticulturists, who are the most skillful and curious in all matters pertaining to the propagation of plants, describe in their works upwards of one hundred different modes of grafting, practiced in different ages and countries, and for the attainment of particular objects; but, however interesting the study of all these may be to the student and experimentalist, the great bulk of them are of little practical utility, and are never applied in the multiplication of fruit trees. It is, therefore, unnecessary to fill up the pages of such a treatise as this, with either a historical account, or description of them. The methods described below are those universally adopted, with slight modifications, by the best practical propagators everywhere at the present day.

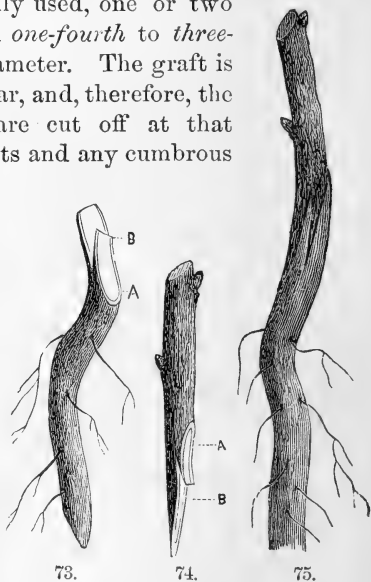
Stocks are of all ages, from a yearling seedling to a tree forty or fifty years old; but of whatever age, they should be sound and healthy. Nursery stocks will be more particularly spoken of in the proper place.

Cions are generally shoots of the previous year's growth. Those bearing fruit-buds are only used for the purpose of experiment, and in that rarely. They should be cut in the autumn after the fall of the leaf, or in the winter, and be preserved carefully in earth until wanted for use. If intended for root-grafting early in the

spring in the house, it will be sufficient to bury their lower ends in earth, in a cool, dry cellar; but if wanted for out-door grafting, they should be buried in *dry sand soil*, in a pit, on the north side of a wall or fence, and deeply covered with earth drawn up in a mound to throw off the water. They are thus kept perfectly dormant until used, and not so dry as to shrivel the bark. They should always be taken from healthy, vigorous trees *exclusively*, and be of firm, well-ripened wood from the upper branches of the tree. A moderate-sized shoot or cion, if well matured and sound, is much better than one as thick as a man's finger, *pithy* and unripe. The implements used in grafting are the *grafting-knife*, *saw*, and *chisel*, (see implements). In whip-grafting or splice-grafting, the stocks being small require the knife only, or not more than the knife and chisel. It is always better to have two knives—one to prune and do the rough work, and the other to prepare the cion. *Grafting composition* is prepared in various ways. *Rosin*, *beeswax*, and *tallow*, in about equal parts, answer very well. Lately, however, we have found it better to use more rosin and less beeswax and tallow; thus, to two pounds of rosin we add one and one-fourth pounds of beeswax, and three-fourths of a pound of tallow. For whip-grafting on the root, and small trees in the nursery, we use thin calico cloth, saturated with this composition, instead of the composition itself, and find it more convenient and expeditious. For root grafts, instead of cloth, we now use paper, which we find answers the purpose perfectly. This paper is a cheap brown article known here as "grafting paper" and is used by nearly all nurserymen for this purpose. The liquid wax is spread on the paper with a brush, after which it is cut into strips an inch or so wide, ready for use. (Instead of tallow we now use raw linseed oil, a pint of which is equal to a pound of tallow.) We tear the calico into narrow strips, roll it into balls, and then soak it in the liquid com-

position until every pore of the cloth is filled with it. The person who applies it to the grafts takes it from these balls, tears it in pieces the length and breadth required by the size of the stock, and two or three turns of it around the graft secure it completely. This thin cloth soon decays, and yields to the enlargement of the part it incloses. We have tried tow, paper, and other materials, but find this the best. Having the cions, implements, and composition in readiness, the work is performed as follows:

Whip-Grafting on the Root.—For this purpose, seedling stocks are generally used, one or two years old, varying from *one-fourth* to *three-eighths* of an inch in diameter. The graft is always made at the collar, and, therefore, the stems of the plants are cut off at that point; the small tap-roots and any cumbrous fibres are removed, leaving them about four inches in length (fig. 73); they are then washed clean, and are ready for the operation. The grafter then makes a smooth, even, sloping cut, an inch long, upwards, on the collar of the root, *A*; and in the center of this cut he makes a slit or tongue, *B*, downwards. The cion, which should be three or four inches long (fig. 74), is cut on the lower end with a sloping cut downwards, and similar



Figs. 73 to 75.—ROOT GRAFTING.

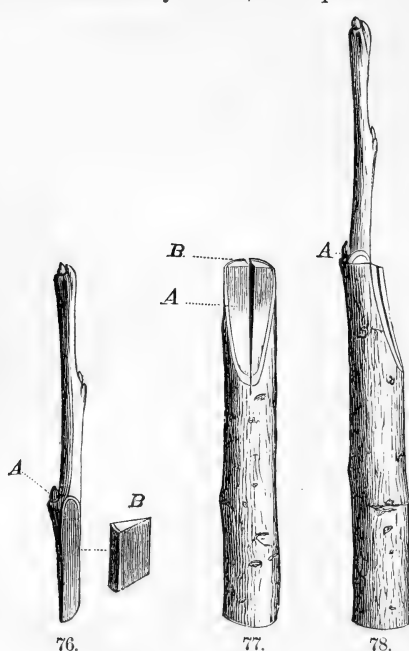
Fig. 73, the root; *A*, the sloping cut; *B*, the tongue. Fig. 74, the cion; *A*, the sloping cut; *B*, the tongue. Fig. 75, the union of cion and stock.

in all respects to that made on the stock; a slit, or tongue, is made in it upwards, *B*, corresponding, also, with that on the stock; and they are then neatly fitted together, the tongue of the one within the other (fig. 75), and the inner barks of both placed in close and perfect contact, at least on one side. The fit should be so complete as to sit close and firm in all parts. The person who applies the wax takes a narrow strip of the cloth or paper described, and wraps it firmly around, covering the parts united. A man and boy can graft of these, twelve to fifteen hundred per day, and by a special effort, two thousand. When the grafting is thus performed, the grafted plants are put away as closely as they can be packed in small boxes, with sandy earth among the roots, and deposited either in a cold cellar or in a dry place out of doors, where frost cannot penetrate to the roots, until planting time in spring.

Whip-Grafting on small trees, standing in the open ground, is performed in precisely the same manner, the oblique or sloping cut and tongue, corresponding in stock and graft, fitting into each other with precision, and the inner bark of both, at least on one side, placed in close contact. Stocks an inch in diameter can be grafted in this way. Either the cloth or the liquid composition may be applied, the latter put on with a brush. For all moderate sized stocks the cloth is preferable. In cold weather, a small furnace can be kept at hand to keep the composition in working order.

Cleft Grafting is practiced on trees or branches too large for whip grafting—say from an inch in diameter upwards. In this case, the cion is cut precisely in the form of a wedge (fig. 76). The part cut for insertion in the stock should be about an inch or an inch and a half long, with a bud (*A*) at the shoulder, where it is to rest on the stock; this bud hastens the union of the parts in the same way as a bud at the base of a cutting, set in the earth,

hastens and facilitates the emission of roots; the outer edge should also be somewhat thicker than the inner. A sloping cut (*A*, fig. 77) is then made on the stock, an inch and a half long; another cut (*B*) is made *across* this cut, about half way down, as at point *B*; the stock is split on



Figs. 76 to 78.—CLEFT GRAFTING.

Fig. 76, cion, with sloping cut on east side, like a wedge; *A*, bnd at the shoulder; *B*, section showing shape of wedge. Fig. 77, the stock cut and split; *A*, the sloping cut; *B*, horizontal cut. Fig. 78, the cion inserted in the stock.

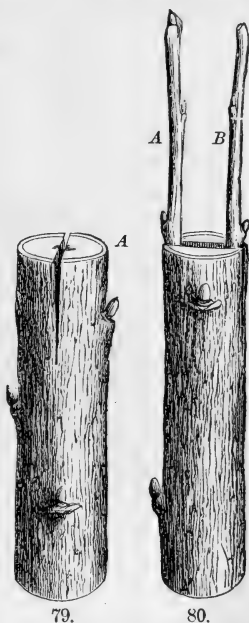
one side of the pith by laying the chisel on the horizontal surface, and striking lightly with a mallet; the split is kept open with the knife or chisel until the cion is inserted, with the thick side out (*A*, fig. 78). Grafts of this kind heal much more rapidly than when cut at once horizontally. Very large branches are sawed horizontally off at the point to be grafted (*A*, fig. 79); the surface is then pared smooth with the knife, a split is made with the chisel, nearly in the center, and *two* wedge-like cions inserted

(*A*, *B*, fig. 80); if both grow, and they are afterwards too close, one can be cut away. Another mode of grafting such large stocks, or branches, is to cut them off horizontally, as above, and pare them smooth with the

knife; then cut the cion on *one* side, about an inch and a half long, making a shoulder at the top; then raise the bark from the stock with the handle of a budding-knife, and insert the cion between the bark and wood; apply the composition the same as in the others, all over the cut part. Two or three cions may be put in each. The principal objection to this mode is that the grafts, if they grow rapidly, are apt to be blown off before they have united strongly to the stock.

The great points to observe *always*, are—to have sharp instruments, that will make smooth, clean cuts; to have placed in perfect contact the inner barks of cion and stock; to have the whole cut surface and every portion of the split perfectly covered with the composition, and to exclude air and water. The cion should always be cut close to a bud at the point (*A*, fig. 76), and have a bud at the shoulder, or point of union with the stock (*A*, fig. 78).

In grafting the heads of large trees, it is not convenient to use the composition in a melted state, to be put on with the brush, and the large cut surfaces cannot well be covered with the cloth; it is, therefore, better to use the composition in such a state that it can be put on with the hands. A very small quantity of brick-dust may be advantageously mixed with it when intended for this purpose, to prevent its being melted by the sun.



Figs. 79 and 80.—CLEFT GRAFTING.

Fig. 79, the stock cut horizontally across at *A*. Fig. 80, the same, with two cions inserted.

Double Working.—When we graft or bud a tree already budded or grafted, we call it “double-worked.” Certain very important advantages are gained by it. Some varieties are of such feeble growth, that it is impossible to make good trees of them in the ordinary way of working on common stocks. In such cases, we use worked trees of strong growing sorts as stocks for them.

Many varieties of the pear do not unite well with the quince stock; we therefore bud other varieties of strong growth, that do succeed, and use them for stocks to work the others on. By this means we are enabled to possess dwarf trees of many varieties, that we could not otherwise have in that form. We have fruited the *Dix* in two years by double working on the quince, when otherwise it would have taken not less than seven. Some varieties of fruit trees are much better than others, though of equal vigor, to graft upon. In the pear, for example, we find the *White Doyenne* makes a good stock for almost all other varieties—superior, in this respect, to any other we have ever experimented with. A great many improvements may be effected, not only in the form and growth of trees, but in the quality of the fruit, by double working. Very few experiments have yet been made on the subject in this country, except from necessity; but the general interest now felt on all matters pertaining to fruit-tree culture cannot fail to direct attention to this and similar matters that have heretofore, in a great measure, been overlooked.

CHAPTER V.

PRUNING—ITS PRINCIPLES AND PRACTICE.

Pruning is one of the most important operations connected with the management of trees. From the removal of the seedling plant from the seed-bed, through all its

successive stages of growth and maturity, pruning, to some extent, and for some purpose, is necessary. It may, therefore, be reasonably presumed that no one is capable of managing trees successfully, and especially those conducted under certain forms, more or less opposed to nature, without knowing well *how to prune, what to prune, and when to prune*. This knowledge can only be acquired by a careful study of the structure of trees, because the pruning applied to a tree must (aside from the general principles on which all pruning depends) be adapted to its particular habits of growth and mode of bearing its fruit. It is in view of this fact that the chapter on the structure and mode of formation of the different parts of fruit trees has been given in the first part of this treatise, that it may form the basis of this branch of culture.

The idea that our bright American sun and clear atmosphere render pruning an almost unnecessary operation, has not only been inculcated by horticultural writers, but has been acted upon in practice to such an extent, that more than three-fourths of all the bearing fruit trees in the country are at this moment either lean, misshaped skeletons, or the heads are perfect masses of wood, unable to yield more than one bushel in ten of fruit, well matured, colored, and ripened.

This is actually the case even in what may be called, in comparison, well-managed orchards. Look at the difference between the fruits produced on young and old trees. The former are open, the fruits are exposed to the sun, and, therefore, they are not only large and perfect, but their skins are smooth and brilliant, as though they were painted and polished. This ought to teach us something about pruning. But this is only one point. We prune one portion of a tree to reduce its vigor, and to favor the growth of another and weaker part. We prune a stem, a branch, or a shoot, to produce ramifications of these parts, and thus change or modify the form of the

whole. We prune to induce fruitfulness, and to diminish it. We prune in the growing as well as in the dormant season, and, finally, we prune both roots and branches. Thus we see that pruning is applied to all parts of the tree, at all seasons, and to produce the most opposite results.

It appears necessary to treat of pruning, under each of these circumstances, separately.

1st. *Pruning to direct the Growth from one part of a tree to another.*—The first period in the existence and growth of a tree in which this becomes necessary, is in the nursery. Those who have had any experience in tree culture, have observed that young trees in nursery rows have a tendency to increase in height without acquiring a well-proportioned increase in diameter. In certain cases, this want of proportion becomes so great, that the tree bends under its own weight, and hence it is necessary to resort to some method of propping it up. This condition is attributable to several causes. First, the absence of a sufficient amount of air and light around the stem, to enable the leaves on it to fulfill their functions properly. It has been shown that the formation of new wood depends upon the elaborating process carried on in the leaves, and that this process can be maintained only in a free exposure to the sun and air. This being the case, it is obvious that any part of the tree excluded from the action of these agents cannot keep pace in growth with other parts to which they have full access. In nursery rows, as trees are usually planted, the stems, after the first year's growth, are to a great extent excluded from the light, consequently the buds and leaves on them cannot perform their parts in the creation of new wood. The top of the tree, however, is fully exposed, and, consequently, it makes a rapid growth towards the free air and light. When this is continued for two or three years in succession, the tree becomes top-heavy; the quantity of

woody fibre at the top is as great as, and it may be greater than, at the bottom; and hence it bends under its own weight.

2d. *The tendency of the sap to the growing points at the top of the tree.*—Growth is always the most active and vigorous at the newly formed parts, when trees are in a natural condition. The young buds are the most excitable, and the more direct their communication with the roots, the more rapid will be their growth. Hence it is that a yearling tree, furnished with fifteen to twenty buds or more, from its base to its top, frequently produces a shoot from its terminal bud only, and seldom more than three or four shoots from the whole number of buds, and these at the top. This natural tendency, and the exclusion of light from the stems of nursery trees by their closeness to one another, are the chief causes of weak and crooked trees, to counteract which we resort to *pruning*.

In “*heading down*” a young tree, we cut away one-third or one-half of the length of the stem, and this removes the actively growing parts. The sap must then find new channels. Its whole force is directed to the buds that were before dormant; they are excited into growth, and produce new wood and leaves; these send down new layers of woody fibre on the old stem, and it increases rapidly in diameter, so that by the time it has attained its former height, the base is two or three times as thick as the top, and possesses sufficient strength to maintain an erect position.

Maintaining an equal Growth among the branches of a tree is conducted on the same principle. Branches that are more favorably placed than others, appropriating more than their due proportion of the sap, and growing too vigorously, are checked by removing more or less of their growing points; this lessens the flow of sap to that point, and it naturally takes its course to the growing

parts of the weaker branches that were left entire, and thus a balance is restored.

Pruning to renew the Growth of stunted trees.—It frequently happens that trees, from certain causes, become stunted, and almost cease to grow, and every part assumes a comparatively dormant condition. In such cases they are cut back, the number of their buds and leaves is reduced, the whole force of the sap is made to act upon the small number remaining, and enables them to produce vigorous young shoots; these send down new woody matter to the stem, new roots are also formed, and thus the whole tree is renewed and invigorated.

Pruning to induce Fruitfulness.—This is conducted on the principle that whatever is favorable to rapid, vigorous growth, is unfavorable to the immediate production of fruit. Hence, the object in view must be to check growth and impede the circulation of the sap—just the opposite of pruning to renew growth. The only period at which this pruning can be performed, is after vegetation has commenced. If a tree is severely pruned immediately after it has put forth its leaves, it receives such a check as to be unable to produce a vigorous growth the same season; the sap is impeded in its circulation, and the result is that a large number of the young shoots that would have made vigorous wood branches, had they not been checked, assume the character of fruit spurs and branches. *Pinching* is the principal mode of pruning to promote fruitfulness, and will be explained hereafter. It depends upon the above principle of impeding the circulation of the sap and checking growth.

Pruning to diminish Fruitfulness is conducted on the same principle as that to renew growth, for this, in fact, is the object.

Pruning the Roots.—This is practiced as well to promote fruitfulness as to lessen the dimensions of trees. The roots, as has been shown, are the organs that absorb

from the ground the principal food of the tree, and in proportion to their number, size, and activity, other things being equal, are the vigor and growth of the stem and branches. Hence, when a tree is deprived of a certain portion of its roots, its supply of food from the soil is lessened, growth is checked, the sap moves slowly in its channels, is better elaborated in the leaves, and the young branches and buds begin to assume a fruitful character.

Roots are also pruned to prevent them from penetrating too deeply into the earth, and to induce the formation of lateral roots near the surface, similar to the cutting back of a stem to produce lateral branches; the principle is the same.

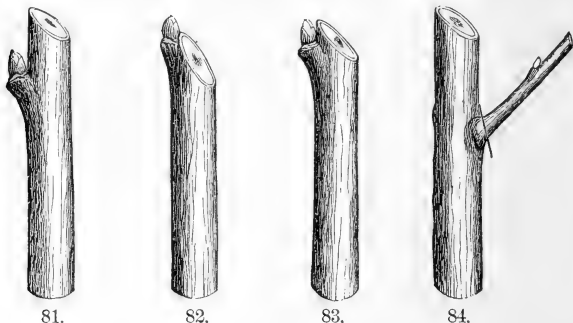
Pruning at the time of Transplanting.—This is performed, not only to remove bruised and broken roots and branches, but to restore the tree to a proper balance. As trees are ordinarily taken from the ground, the roots are bruised, broken, or mutilated, to a greater or less extent. This obviously destroys the natural balance or proportion that existed between the roots and stem, and in such a condition the tree is unable to grow. The demand upon the roots must therefore be lessened by reducing the stem and branches in length or number, or both; and the more the roots have suffered, the greater must be the reduction of the stem and branches to bring them to a corresponding condition.

PRUNING MECHANICALLY CONSIDERED.

Having now treated of the principles on which pruning depends, it remains to speak of its mechanical execution; for it is not only necessary to know what and why, but *how* to prune. Theory is only useful as it serves to guide in practice.

1st. *Pruning Stems or Branches.*—The great point to be observed in making incisions on the stems and branches

of trees, is to provide for the speedy and perfect healing of the wounds, or cut surfaces. In removing a portion of a branch, or stem, if we cut between two joints, and thus leave a portion of wood above the bud intended to be cut to, as in fig. 81, this wood dies, and we have the trouble of another pruning to remove it. If we cut too close to the bud, and thus remove a portion of the wood with which it is connected, as in fig. 82, the bud will either die, or disappoint us by producing a very feeble growth. The proper way is to take the branch to be operated on in the left hand, place the edge of the knife



Figs. 81 to 84.—PRUNING.

Fig. 81, cutting too far above the bud. Fig. 82, cutting too close. Fig. 83, the cut as it should be. Fig. 84, removal of a branch, the cross-line indicating the proper place for the cut.

on it, opposite the lower part of the bud to be cut to, and then make a firm, quick, smooth draw-cut, sloping upwards, so that the knife will come out on a level with the point of the bud, as in fig. 83. In soft-wooded, pithy trees, like the grape-vine, for example, half an inch of wood ought to be left above the bud. The cut should also be made as much as possible on the lower side of the branch to prevent rain from lodging in the center. The position of the bud cut to is also worthy of consideration in pruning, to produce or modify certain forms. When

we wish the new shoot of a lateral branch to take, as much as possible, an *upright* direction, we prune to a bud on the *inside*; and if we wish it to *spread*, we choose one on the *outside*. In the annual suppression, or cutting back of young trees, to form a stem or side branches, the bud selected to form the leader is chosen on *opposite sides every successive year*, in order to maintain the growth in a straight line. If cut every year to a bud on the same side, it would, in two or three seasons, show an inclination to that side injurious to the symmetry of the tree.

The removal of large Branches, where they are to be entirely separated from the tree, is often very clumsily performed. In orchards, it is not at all uncommon to see them chopped off with a common axe; and even in gardens there seem to be few persons who either know how, or take the proper care in this matter. They are either cut so that a portion of the base of the branch remains, and sends out vigorous shoots, defeating the objects of the pruning, or they are cut so close that a portion of the wood of the main branch or stem is taken with them, and a wound made that years are required to heal up. Both these extremes ought to be avoided.

The surface of the cut made by the removal of a branch should in no case be larger than the base of the branch. Where a branch is united to another or to the main stem, we notice, both above and below the point of union, a small projection, or shoulder, as at the cross-line in fig. 84. The knife must enter just below that shoulder, and, by being drawn upwards in a straight line, the base is so completely removed that no shoots can be produced there, and yet the cut surface on the stem is no larger than the base of the branch. When the saw is used, the surface of the cut should be pared smooth with the knife, both to prevent water lodging on it, and to facilitate the healing of the wound.

2d. *Pruning the Roots.*—This is performed by opening a trench around the tree, just at the extremities of the roots: the distance from the tree will, therefore, depend on its size, and the spreading character of the roots. The trench should be the width of a common garden spade, and deep enough to admit of an inspection of all the roots of the tree. If the lateral roots are to be shortened, this is done first. The knife should be placed on the lower side of the root, and the part separated with a clean draw-cut, such as would be performed on a branch. If the tree has vertical or tap roots, they are most easily operated on with a sharp spade, prepared and kept for the purpose. A smart stroke with such a spade, in as nearly a horizontal direction as possible, will separate a pretty strong root. The extent to which root pruning may be performed depends on the character of the species, the condition of the tree as regards growth, and the object aimed at. Those practising it for the first time should go to work with great caution. It will be better to operate too lightly than too severely. As regards the season, it may be performed either at the end of the first growth, in July or August, or in the autumn or winter, when vegetation is quite suspended. We have operated on cherry trees with complete success in August, in a dry time, when little growth was going on. At this season, a copious watering should be given after the pruning is performed.

Implements of pruning, and the mode of using them, will be treated of in the chapter on implements, to be given hereafter.

The Season for Pruning.—We are not permitted to be very definite on this point. The climate, the nature of the species, etc., control the period of pruning to a great extent. In the South, what we term the winter pruning—that performed during the dormant season—may be done very soon after the fall of the leaf. In the North,

it is deferred to February, March, and even April. In Western New York, we prune *apples*, *pears*, and other hardy fruits any time that we have leisure, between the fall of the leaf and the first of April.

The *peach* we prune just as the buds begin to swell. The fruit and leaf buds are then easily distinguished from one another, and the objects of the pruning are accomplished with more precision.

Grapes may be pruned any time in the winter, as a portion of wood is always left above the bud; and if the wood is wanted for propagation, it should be cut before the season of severe frosts arrive, as the buds are liable to be injured. *Gooseberries* and *currants*, also, any time in winter. The stone fruits should always be lightly pruned, because severe amputations almost invariably produce the gum. Where it is absolutely necessary, in the spring, the wound should be coated with grafting composition, or with that recommended by Mr. Downing: "Alcohol, with sufficient gum shellac dissolved in it to make a liquid of the consistence of paint, to be put on with a brush."

This excludes air, and is not affected by changes of weather.

Pinching is a sort of anticipated pruning, practiced upon the young growing shoots, intended to promote a uniform circulation of the sap, and thus regulate the growth, and also to induce fruitfulness.

1st. *To regulate the Growth*.—In the management of trees, this is an operation of great importance, as it obviates the necessity of heavy amputations being made at the winter or spring pruning. Instead of allowing certain superfluous or misplaced shoots to acquire their full development at the expense of other parts, we pinch them early, and give to the necessary parts, or branches of the tree, the nutriment which they would have appropriated if allowed to remain. In this way we are able to obtain

results in one season that two or more would be required for, if we depended wholly on the winter pruning. We will suppose, for an example, the case of a young nursery tree in the second year, intended for a standard. In ordinary cases, the terminal bud, either the natural one or

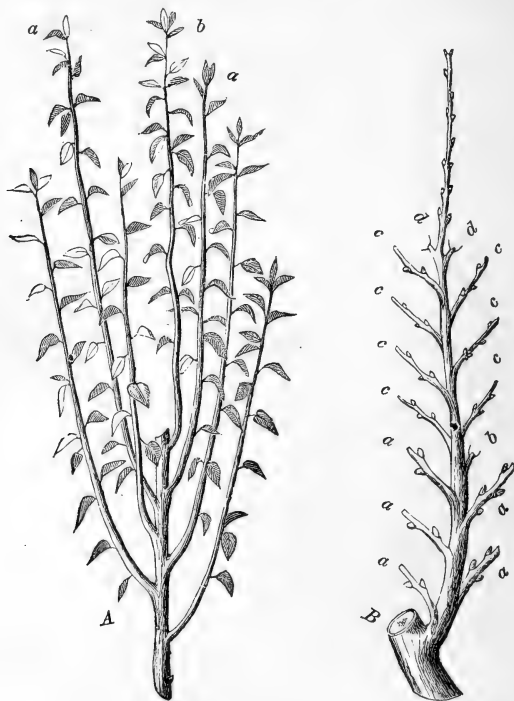


Fig. 85, A—Fig. 85, B.—PRUNING AND PINCHING.

Fig 85, A, head of a young tree ; *b*, the leader ; *a*, *a*, vigorous shoots below it, that ought to have been pinched. Fig. 85, B, a branch of the pear, twice cut back, with the lateral shoots pinched ; *a*, *a*, the first section ; *c*, *c*, *c*, the second ; *b*, and *d*, *d*, shoots pinched close to favor the leader and those below them.

that pruned to, is developed into the leading shoot or stem, and a greater or less number of buds below it produce branches ; and it frequently happens that some of

these, if not pinched, acquire so much vigor as to injure the leader, and produce a consequent deformity in the tree. Figure 85 (A) represents a case of this kind, which is very common, and too often neglected. The shoots, *a*, *a*, ought to have been pinched the moment they began to exhibit a disposition to outgrow the leader. There are other cases, still worse than this, familiar to all tree growers; for instance, where a strong shoot is produced on the middle or lower part of the stem, attracting an undue proportion of the sap, thus contracting the growth of all other parts, and giving the young tree a deformed character. All such shoots as these should be nipped early, the moment their character is apparent, and thus a year's growth, nearly, will be saved to the tree, and its proper form and proportions be preserved. In conducting young trees for pyramids, the constant and careful application of pinching is absolutely necessary, for in them we must have the lower branches always the strongest and longest, and it is only by operating on the shoots, in their earliest stages of growth, that we can fully attain this end; for the strongest shoots do not always grow at the desired point, but by timely attention they are perfectly within our control. The various accidents and circumstances to which young trees are subject, give rise, in a multitude of cases, to an unequal distribution of the sap in their different parts, and this produces, to a greater or less extent, deformity of growth. This at once shows the necessity for pinching, to check the strong and favor the weak.

Pinching to promote Fruitfulness.—Those who have never practised this, or observed its results, may have seen, if experienced in tree growing, that a shoot of which the point was broken, bruised, or otherwise injured, during the growing season, frequently becomes a fruit branch either during the same or the following season; and this, especially if situated in the interior of the tree, or on the

older and lower parts of the branches. The check given to the extension of the shoot concentrates the sap in the part remaining; and, unless the check has been given very early in the season, or the growth is very vigorous in the tree, so that the buds will break and form shoots, they are certain to prepare for the production of fruit. It is on this principle of checking the growth and concentrating the sap in the pinched shoot, that pinching to induce fruitfulness is performed; and its efficiency may be estimated from the fact, that trees on which it has been practised, have borne fruit four or five, and perhaps seven years, sooner than they would have done without it.

It is a most useful operation in the case of vigorous growing and tardy bearing sorts. The *mode of performing it* is to pinch off the end of the shoot with the finger and thumb; if a small portion of the remaining part be bruised, no matter, it offers a greater check than if a clean cut were made, as in pruning to a bud; and in the general winter or spring pruning which follows, the bruised parts can be cleanly separated. The *time to perform it* depends wholly on circumstances. If the object be to regulate growth, then the time to do it is when the tendency to undue or ill-proportioned growth is first observable, and this will be from the time the young shoots are two to three inches long and upwards. The particular season of the year or day of the month will, of course, depend upon the earliness or lateness of the season, and on the soil and situation as well as on the habits of growth of the species or variety to be operated on. The true way is to be always on the watch. If the object be to induce fruitfulness, the length which the shoots should attain before being pinched, depends upon the nature or mode of growth and bearing of the species, and will be more definitely treated hereafter, under the head of "The Pruning of Trees;" the object now being merely to indicate general principles and modes of operating. To illustrate this, let

us suppose the lateral branch of a pear tree, (fig. 85, *B*). This was cut back the first time to *b*, and below that point five shoots were produced, none of which were needed for branches. We therefore pinched them in June, when about three inches long or thereabouts, and the result is, they are now fruit branches. The same branch was cut back the second time to *d*, *d*, and on that section seven shoots were produced that were not needed in the form of the tree, and were consequently pinched, and will become fruit branches. At the points *b*, and *d*, *d*, are small spurs, the base of shoots that have been pinched close to favor the growth of the leader, as well as the development of the shoots below. Without pinching, it would have been impossible to obtain such results in this branch in the same time.

M. Dubreuil, formerly Professor of Arboriculture in the Garden of Plants at Rouen, in France, sums up the general principles of pruning as follows. (I may remark here, that in 1849 I visited the Rouen garden, and found M. Dubreuil's theory and practice beautifully illustrated on the trees in his charge. My visit was made at the time of his practical lectures, and I was able to examine the whole with the most satisfactory minuteness. The trees there, under all forms, and embracing all the hardy species of fruits, were the best that I found anywhere, not even excepting the much admired and famous pyramidal pear trees of M. Cappe, at Paris. They were not only perfect in form, but, as regards *vigor* and *fruitfulness*, in the most admirable condition.) He says:

"The theory of the pruning of fruit trees rests on the following six general principles:

"1. *The vigor of a tree, subjected to pruning, depends, in a great measure, on the equal distribution of sap in all its branches.*

"In fruit trees abandoned to themselves, the sap is equally distributed in the different parts without any other

aid than nature, because the tree assumes the form most in harmony with the natural tendency of the sap.*

“But in those submitted to pruning, it is different; the forms imposed on them, such as espalier, pyramid, vase, etc., change more or less the normal direction of the sap, and prevent it from taking the form proper to its species. Thus nearly all the forms given to trees require the development of ramifications more or less numerous, and of greater or less dimensions at the base of the stem. And, as the sap tends by preference towards the summit of the tree, it happens that, unless great care be taken, the branches at the base become feeble, and finally dry up, and the form intended to be obtained disappears, to be replaced by the natural form, that is, a stem or a trunk with a branching head. It is then indispensable, if we wish to preserve the form we impose upon trees, to employ certain means, by the aid of which the natural direction of the sap can be changed and directed towards the points where we wish to obtain the most vigorous growth. To do this we must arrest vegetation in the parts to which the sap is carried in too great abundance, and on the contrary favor the parts that do not receive enough. To accomplish this the following means must be successively employed.

“(1.) *Prune the branches of the most vigorous parts very short, and those of the weak parts long.* We know that the sap is attracted by the leaves. The removal of a large number of wood-buds from the vigorous parts, deprives these parts of the leaves which these buds would have produced; consequently the sap is attracted there in less quantities, and the growth thereby diminished. The feeble

* This is not true in all cases. Peach trees, we know, in our climate, left to themselves, exhibit a very striking example of the unequal distribution of the sap. The ends of the branches attract nearly the whole, leaving the lateral shoots and lower parts to die out. In other species, similar instances might be quoted, and as a general thing, the proposition is unsound, except in a comparative sense.

parts being pruned long, present a great number of buds, which produce a large surface of leaves, and these attract the sap and acquire a vigorous growth. This principle holds good in all trees, under whatever form they may be conducted.

“(2.) *Leave a large quantity of fruit on the strong part, and remove the whole, or greater part, from the feeble.* We know already that the fruit has the property of attracting to it the sap from the roots, and of employing it entirely to its own growth. The necessary result of this is, what we are about to point out, viz., that all the sap which arrives in the strong parts, will be absorbed by the fruits, and the wood there, in consequence, will make but little growth; while on the feeble part, deprived of fruits, the sap will all be appropriated by the growing parts, and they will increase in size and strength.

“(3.) *Bend the strong parts, and keep the weak erect.* The more erect the branches and stem are, the greater will be the flow of sap to the growing parts; hence, the feeble parts being erect, attract much more sap than the strong parts inclined, and, consequently, make a more vigorous growth and soon recover their balance. This remedy is more especially applied to espalier trees.

“(4.) *Remove from the vigorous parts the superfluous shoots as early in the season as possible, and from the feeble parts as late as possible.* The fewer the number of young shoots there are on a branch, the fewer there are of leaves, and consequently the less is the sap attracted there. Hence, in leaving the young shoots on the feeble part, their leaves attract the sap there, and induce a vigorous growth.

“(5.) *Pinch early the soft extremities of the shoots on the vigorous parts, and as late as possible on the feeble parts, excepting always any shoots which may be too vigorous for their position.* By thus pinching early, the strong part, the flow of sap to that point is checked, and natural-

ly turns to the growing parts that have not been pinched; this remedy is applicable to trees in all forms.

“(6.) *Lay in the strong shoots on the trellis early, and leave the feeble parts loose as long as possible.* Laying in the strong parts obstructs the circulation of the sap in them, and consequently favors the weak parts that are loose. This is only applicable to espaliers.

“(7.) *In espalier trees, giving the feeble parts the benefit of the light and confining the strong parts more in the shade, restores a balance,* for light is the agent which enables leaves to perform their functions and their action on the roots, and the parts receiving the greatest proportion of it acquire the most vigorous development.

“2. *The sap acts with greater force and produces more vigorous growth on a branch or shoot pruned short than on one pruned long.* This is easily explained. The sap, acting on two buds, must evidently produce a greater development of wood on them than if it were divided between fifteen or twenty buds.

“It follows from this, that if we wish to obtain wood branches, we prune short, for vigorous shoots produce few fruit-buds. On the contrary, if we wish to obtain fruit branches, we prune long, because the most slender or feeble shoots are the most disposed to fruit.

“Another application of this principle is to prune short, for a year or two, such trees or parts as have been enfeebled by overbearing. (This principle deserves especial attention, as its application is of great importance.)

“3. *The sap tending always to the extremities of the shoots causes the terminal bud to push with greater vigor than the laterals.* According to this principle, when we wish a prolongment of a stem or branch, we should prune to a vigorous wood-bud, and leave no production that can interfere with the action of the sap on it.

“4. *The more the sap is obstructed in its circulation, the more likely it will be to produce fruit-buds.* This

principle is founded on a fact to which we have already had occasion to refer, viz., that the sap circulating slowly is subjected to a more complete elaboration in the tissues of the tree, and becomes better adapted to the formation of fruit-buds.

“This principle can be applied to produce the following results: When we wish to produce fruit-buds on a branch, we prevent a free circulation of the sap by bending the branches, or by making annular or circular incisions on it; and, on the contrary, when we wish to change a fruit branch into a wood branch, we give it a vertical position, or prune it to two or three buds, on which we concentrate the action of the sap, and thus induce their vigorous development.

“5. *The leaves serve to prepare the sap absorbed by the roots for the nourishment of the tree, and aid the formation of buds on the shoots. All trees, therefore, deprived of their leaves, are liable to perish.* This principle shows how dangerous it is to remove a large quantity of leaves from trees under the pretext of aiding the growth or ripening of fruits, for the leaves are the nourishing organs, and the trees deprived of them cannot continue to grow, neither can the fruit; and the branches so stripped will have feeble, ill-formed buds, which will, the following year, produce a weak and sickly growth.

“6. *Where the buds of any shoot or branch do not develop before the age of two years, they can only be forced into activity by a very close pruning, and in some cases, as the peach, this even will often fail.* This last principle shows the importance of pruning the main branches of espaliers especially, so as to insure the development of the buds of their successive sections, and to preserve well the side shoots thus produced, for without this, the interior of the tree will become naked and unproductive, and a remedy will be very difficult.”

If these principles and practices of pruning be carefully

studied in connection with the habits of growth and bearing of the different fruit trees, pruning will be comparatively an easy matter. The mode of obtaining any particular form or character cannot fail to be perfectly plain and simple; yet no one need hope to accomplish, in all things, the precise results aimed at, for even the most skillful operator is sometimes disappointed; but those who give constant attention to their trees will always discover a failure in time to apply a remedy.

I insist upon it, because I have been taught it by most abundant experience, that the most unremitting watchfulness is necessary in conducting trees in particular forms. It is not, by any means, *labor* that is required, but attention that the most delicate hand can perform. Fifteen or twenty minutes at a time, say three times a week during active growth, will be sufficient to examine every shoot on a moderate collection of garden trees; for the eye very soon becomes trained so well to the work, that a glance at a tree will detect the parts that are either too strong or too weak, or that in any way require attention. This is one of the most interesting features in the management of garden trees. We are never allowed to forget them. From day to day they require some attention, and offer some new point of interest that attracts us to them, and augments our solicitude for their prosperity, until it actually grows into enthusiasm.

PART II.



THE NURSERY.



THE NURSERY.

CHAPTER I.

SECTION 1.—SOIL, SITUATION, ETC.

It is not a part of the design of this treatise to give anything like a full exposition of nursery operations, for this would, in itself, be a subject sufficiently extensive to form a volume; but as all fruit growers should possess at least some knowledge of nursery management, it seems quite necessary that the more important points should be noticed.

1st. *The Soil, as to Dryness.*—For a fruit-tree nursery the soil must be *perfectly dry*, both above and below. In damp, springy soils, or where the subsoil is so compact as not to admit of the surface water passing off immediately, trees do not thrive; the roots are destitute of fibres, the wood is watery and delicate, and where frosts are severe, the trees are cast out of the ground by the expansion of the water with which the soil is filled. We have known of a single instance in which several thousand dollars were lost by planting a pear nursery on a soil imperfectly drained. The plants grew finely the first season, were budded, the buds had taken, and in the autumn all looked prosperous; but the autumn rains filled the soil with water; the situation was low and level, and the subsoil compact, so that the water could not possibly get away. The consequence was, the roots decayed, the plants were cast out of the ground, and the injury was so great and so general that the whole plantation had to be taken up. This ground was then thoroughly drained, and is now as good a pear soil as can be found. This single instance illustrates the importance of a dry soil, as well as twenty would. We frequently find that, in the same row of trees, if there happens to be a low, damp spot, the trees in it

have no fibrous roots, and are altogether inferior to those on the adjacent dry ground.

2d. *Depth*.—As a general thing, the soil of a nursery should be a foot to eighteen inches deep; but all trees do not require the same depth. Those (such as the pear) whose roots *descend* more than they *spread*, require the deepest soil. The best quality of nursery trees are grown on common farming land, twice plowed with the common and subsoil plows, one following the other, as described in the chapter on soils. This gives depth enough for all ordinary purposes.

3d. *Texture*.—A soil of medium texture, between the heavy and the light, is, on the whole, the most advantageous, as being the best adapted to general purposes. A good friable loam, with a gravelly subsoil, or a mixture of sand, gravel, and clay, that will allow water to pass off freely, will be found suitable for almost any species; and one great advantage of such a soil is, that it admits of rotation in crops.

4th. *Quality*.—For the growth of young fruit trees, a soil should be in such a condition as to furnish a sufficient supply of nutriment to insure a vigorous and robust growth; but it may be too rich, and produce rank wood that will not mature properly, and be unable to withstand the change of climate or soil consequent upon transplanting. Where manures are used, they should be well decomposed; fresh, warm manures excite trees into a very rapid growth, but the wood is watery and feeble. A dry soil, of moderate richness, produces hardy trees; their wood is firm, the buds plump and close together, and the parts well proportioned.

5th. *Laying out*.—Where the nursery is of considerable extent, the ground should be laid out and arranged in square or rectangular plots of convenient size, and be intersected with walks. One portion should be set apart for the propagation of stocks from layers, another for

cuttings, another for seeds, etc. In setting apart ground for the different kinds of trees, if there be a choice, the pear should have the deepest and best, the plum the most compact or clayey, the peach, apricot, cherry, etc., the lightest and driest.

6th. *Exposure*.—Nursery ground for fruit trees should be well elevated, but not fully exposed to the prevailing high winds, as the young trees are apt to be broken off during the first year's growth if not kept well tied up to stakes. In our section, we find it very advantageous to have some protection from the west winds especially, though we sometimes have a south wind quite destructive to the young buds in exposed places. Situations into which the snow is liable to drift should be avoided, in sections where heavy snow-storms prevail, for sometimes vast quantities of trees are broken down in corners of fences and sheltered situations where the snow accumulates in heavy drifts.

7th. *Rotation or Succession of Crops*.—This is quite as important in the management of the nursery as of the farm. Not more than one crop of one species should be planted on the same ground, and those of the most opposite character should follow one another. Where one species is grown on the same ground for eight or ten years, it is found by experience that even the most liberal manuring fails to produce such fine, sound, healthy, and vigorous trees as new ground without manure. Where land is scarce, and it is necessary to use the same ground for the same kind of trees, it should at least be allowed one, but much better, two or three seasons' rest, and be well supplied with such material as the trees to be grown in it require, in the largest quantities, or in which the soil is found to be most deficient. Our own practice is to seed down with clover, and break up the second or third year; giving before plowing a dressing of manure, adapted in quantity and quality to the wants of the soil.

SECTION 2.—DESCRIPTION AND PROPAGATION OF STOCKS.

This branch of the subject is of such importance, and involves so many considerations, that it seems to be more methodical to treat it separately from subsequent operations.

1st. *Stocks for the Apple*.—The principal stocks in use for the apple are the *common seedling*, or *free stock*, the *Doucin*, and the *Paradise*.

Seedlings, or *free stocks*, are ordinarily produced from seeds taken promiscuously from the cider-mill in the autumn.

Preparing the Seed.—The cakes of pressed pomace are broken up, and the coarser materials, straw, etc., separated from it by means of a coarse sieve; the sifted pomace is then put into large tubs, and subjected to repeated washings until clean. The clean, plump seeds fall to the bottom, and the pomace and light, poor seeds are carried off in the washings. When fruits have been selected for the seeds, they are placed in heaps until fermentation and decay have reduced the flesh to a soft, pulpy state, when they are washed in tubs, in the same manner as pomace.

Saving the Seed.—When the seed is washed out as above, it must be spread thinly on boards, and repeatedly turned over until perfectly dry, when it is put away in boxes, mixed with sand containing a slight degree of moisture. The boxes should be well secured against vermin, and be kept in a dry, cool place until the time of planting.

Season and Mode of Planting.—If the ground be in readiness, and perfectly dry and friable, the best time is the fall, as soon as the seeds are cleaned. At this season the pomace, seeds and all, as it comes from the press, may be planted without any washing. It should be broken up fine, so that it may be evenly distributed in the seed bed. The difficulty of doing this, is a serious objection to

this mode. By taking some pains in the sowing, we raise as good stocks in this as in any other way; the decayed pulp contributes considerable nutriment to the young plants in their earliest stage of growth.

When deferred until spring, it should be done at the earliest moment that the condition of the ground will admit. When the ground is ready, a line is stretched along one side of the plot, and a drill opened with a hoe about eight or ten inches wide, and three deep; the seeds are then dropped, and the fine earth drawn over them with the hoe as regularly as possible, covering them about three inches deep. If some leaf mould from the woods, or old decomposed manure, in a fit state for spreading, could be had, and a covering of it an inch in depth spread on the top of the drills, it would prevent the surface from baking or cracking, and allow the plants to come up with greater strength and regularity. Whatever depth be used of such a covering, it should be deducted from the covering of common earth.

Distance to Plant.—When large quantities are raised, the drills should be three feet apart, to admit of the cultivator passing between them; for the ground should be kept perfectly clean and mellow around seedlings the whole season.

After Management.—It is of great importance that they be not in any way stunted; neither in first coming through the soil by a hard surface, nor afterwards by weeds and lack of culture; seedlings, stunted during the early stages of their growth, never make vigorous, healthy stocks; and, indeed, should never be planted. When they appear above the surface, and are too close together, they should, as soon as possible, be thinned out to regular distances; for, when grown up in dense masses, they are generally feeble and worthless. One hundred good, vigorous stocks are worth five hundred poor ones. It is very common to see seedlings of one year larger than those of two years,

under different management; and, in such a case, the yearlings are worth twice as much as the others. A very good plan is to thin out all the weakest plants when about four or five inches high, leaving only those of vigorous habit and large foliage. The prevailing error in growing apple seedlings, and, I may add, all seedlings, is that of having them too close together—usually three or four times as many on the ground as there should be. Give them plenty of room, good soil, and clean culture, and you will have good stocks.

The *Doucin* is a distinct species of apple. The tree is of medium size, bears small, sweet fruit, and reproduces itself from seed. It is used for stocks for apple trees of medium size, *pyramids*, or *dwarf standards* for gardens. It is propagated almost exclusively from layers. (See fig. 63.) The plants to be propagated from are planted in a rich, deep, friable soil, and cut back to within four to six inches of the collar; the buds, on the part below the cut, will, during the next season, produce strong shoots; the following spring the earth is drawn up around each plant in the form of a mound, so that the whole of the stem and the base of all the shoots will be covered at least three inches deep; during that season, all the shoots will produce roots, and should be separated from the mother plant, or stool, as such plants are termed, in the fall. If left on until spring, the frost would be likely to injure them. The stools are then dressed, the soil around them is spaded up and enriched with well-decayed manure; and the following season another crop of shoots is produced, much more numerous than the first, to be treated in the same way. Every year these stool plants increase in size and in the quantity of their productions, if well treated. Another course, but not so good, is frequently pursued when stocks are scarce. The shoots are layered by bending down, as described in layering, the first season of their growth in July, and may be sufficiently rooted in the fall

to be transferred to nursery rows in the spring following; a year is thus saved, but the stocks are, of course, much inferior. If earthed up in midsummer, they will be partially rooted in the autumn, too, but not so well as if bent down; for the bending has a tendency to stop the sap at the point fastened to the ground, and hastens the formation of roots. This stock may also be propagated from root cuttings.

The *Paradise*.—This, also, is a distinct species of apple. The tree is of very small size, never attaining over three to four feet in height. It is used for stocks for dwarf trees or bushes that occupy but a small space in the garden. It is propagated in precisely the same manner as that described for the Doucin.

2d. *Stocks for the Pear*.—The *pear seedling* and the *quince* are the only two stocks on which the pear can be advantageously worked to any considerable extent. The Mountain Ash and the Thorn are occasionally used for special purposes only.

Pear Seedlings.—The seeds are obtained by collecting such fruits as can be had containing perfect seeds. Nearly all the seeds used in this country, of late years, have been imported from Europe. Great care should be taken to gather the fruits of hardy, healthy, vigorous trees only, and the seeds should be full and plump. The seeds are separated and washed, as described for apples. They are also saved and planted in a manner similar in all respects; but, in this country, it is a much more difficult matter to succeed with pear seedlings than with the apple. This difficulty is owing chiefly to a species of fungus, called "leaf-blight," that attacks the leaves of the young plants, very often before they have completed their first season's growth. To obviate the difficulty which this malady presents, a vigorous growth should be obtained early in the season. New soil, or that in which trees have not before been grown, should be selected—an old pasture is the

best. The autumn before planting it should be trenched, or subsoil-plowed, to the depth of two feet, for the pear has long tap roots, and liberally enriched with a compost of *stable manure*, *leaf mould*, or *muck*, and *wood-ashes*, in about equal parts; four inches deep of this, spread over the surface before plowing, will be sufficient for any ordinary soil. Lime should also be given liberally, unless the soil be naturally and strongly calcareous. A soil prepared thus in the fall, will require another plowing or spading in the spring, to mix all the materials properly with the soil, and fit it for the seeds. If the soil be very tough, and not fit to be turned up, a thorough harrowing or working with the horse-hoe will do. Where large quantities are grown, the drills may be the same distance apart as that recommended for apples—*three feet*; but if only a few, twelve to eighteen inches will be sufficient, as the cleaning can be done with the hoe. The seeds should be scattered thinly, that every plant may have sufficient space without any thinning. The end to aim at, as before remarked, is to get good growth, say eighteen to twenty inches in height, and stout in proportion, before the first of August. This can be done in any deeply-trenched or plowed fresh soil, well prepared and manured, as described above. I have been told that seedling pears, grown in a frame, covered with whitewashed sash, and kept well ventilated continually, escaped the “leaf-blight,” whilst all those grown in open ground, near by, were blighted; showing, as far as the experiment goes, that the sun’s heat has something to do with producing leaf-blight. Pear seedlings should always be taken up in the fall, after the first season’s growth; the largest selected for transplanting into the nursery, and the smaller to be put into beds, to remain another season.

Quince Stocks are propagated with considerable success by cuttings. These should be strong shoots, six inches to a foot long, taken off close to the old wood, and, if pos-

sible, with a small portion attached, prepared as directed in article on cuttings, early in the winter, and kept in pits two or three feet below the surface of the soil, in a dry place, until planting time, in spring. If practicable, plant early in the fall, as soon as the wood is ripe, and cover with leaves on setting in of winter, to prevent hard freezing; success will be more certain. They should be planted in a *light, friable, deep soil*, in rows eighteen inches to two feet apart, four to six inches apart in the row, and so deep that but a couple of buds remain above the surface. The ground should be kept clean and mellow amongst them all summer, and, if the cuttings were stout and long, they will, in the autumn, be fit for taking up and preparing for planting into nursery rows the following spring. The best and surest method of propagating the quince stock, however, is by *layers*. The manner of layering is that recommended for the *Doucin* and *Paradise*—by earthing up (fig. 65). The stool plants should be set out in a fine, rich, deep border of warm, friable soil, and be about six feet apart, when designed to be permanent. As each stool, by the system recommended, can only yield a crop of plants every two years, there should be two sets, so that an annual supply may be obtained. These stools, in spite of the best treatment, become enfeebled in a few years, and successive plantations must be made where continual propagation is intended.

By the ordinary system of bending down the shoots, and slitting, or even without the slitting, a crop may be obtained every year—that is, the shoots of the current season's growth may be layered in July or August; but no such stocks can be obtained as by the earthing up and taking a crop every two years. This is the system recommended to those who want *first-rate quince stocks*.

The very general lack of information in this country on the subject of quince stocks for pears has given rise to a great many misapprehensions and erroneous statements in

regard to them, both by horticultural writers and others. At first it was said that the stocks used by the French, and imported by nurserymen here, were the *Portugal*. Again, it was discovered they were nothing more than the common apple quince; consequently, a multitude of the apple quinces have been worked, and sent out as "*dwarf pears*." The slow and feeble growth of this variety unfits it entirely for a stock for the pear, and only a very few varieties will form a union with it that will last over three or four years. Such trees cannot fail to give general dissatisfaction, and, among people who know no better, create a prejudice against quince stocks in general. Indeed, this is the cause why so much has been said about the pears on quince being so short-lived.

The truth is, that the varieties used in France are neither the Apple nor the Portugal Quince, but vigorous varieties that have been originated there, and found to answer this purpose particularly well. The great requisite of a quince stock for the pear is a *free, vigorous, and rapid growth*. A variety originated at the town of Angers, in France, and extensively used, propagated, and sold there as the *Angers Quince*, has proved to be an excellent stock. It is a very rapid, vigorous grower, making strong shoots three feet long, in one season. It has large foliage, resembling the Portugal. In some parts of France, as in Normandy, it is known as the *broad-leaved*. There is another variety, with smaller leaves, but of free, vigorous growth, too, almost exclusively cultivated in some districts. Several extensive nurserymen at Orleans, Paris, and elsewhere, consider it superior to the broad-leaved, and especially for very vigorous growing sorts. It is known as the Paris or Fontenay Quince.

We have tried both extensively, and find but very little difference, thus far, in the results obtained. In the first edition of this work, I alluded to an upright growing variety which then promised to be valuable, but has since

proved to be too feeble in its growth to be used advantageously for a stock for fruit trees, so it is abandoned.

The *Mountain Ash*, it is said, makes a good stock for certain varieties in very light, sandy soils, when neither the pear nor quince succeeds well. It is propagated from seed, and requires to be two years old before being worked.

The *Thorn*.—Seedlings of our vigorous, native thorns make good stocks when about three years old; the seeds require to be in the rot-heap one year before sowing. The only cases in which it can be recommended are those in which a soil may be so wet and cold as to be unfit for the pear or quince; but it is better to improve such soils by draining, subsoil plowing, and by the addition of suitable composts; for even the thorn will fail in giving satisfaction on a stiff, cold soil. I cannot recommend either the Thorn or Mountain Ash as a stock for the pear, except as a matter of fancy or experiment.

3d. *Stocks for the Cherry*.—The principal stocks used for the cherry are the *Mazzard*, for standard orchard trees, and the *Mahaleb*, for garden pyramids and dwarfs.

Mazzard Seedlings.—The Mazzard cherry is a lofty, rapid-growing, pyramidal-headed tree. Its fruit is small, dark brown or black, with a sprightly flavor, and slight bitterness. It is the original type of all the heart varieties.

The *Mahaleb* (*Cerasus Mahaleb*) is a small tree, with glossy, deep-green foliage. The fruit is black, about the size of a marrowfat pea, and quite bitter. It blossoms and bears fruit when about three years old. It is considerably cultivated in many parts of Europe as an ornamental lawn tree. There are few bearing trees in this country yet; consequently, a large proportion of the stocks are imported, or grown from imported seeds.

The seeds are prepared, saved, sown, and managed, in all respects, similar to the Mazzards, and are fit for trans-

ferring to the nursery rows at the end of the first season's growth.

The *common Red Pie cherry*, and the *Small Morello*, make very good stocks for dwarf trees of the Duke and Morello classes; but the Hearts and Bigarreaus do not take well on them. These are raised from seed in the same way as the Mazzards and Mahalebs. I observe that Western fruit growers are now recommending this stock in preference to all others for that climate, on account of its hardiness. I do not think, however, that it will be used as a stock to any great extent.

Preparing and Saving the Seeds.—The fruit is allowed to remain on the tree until thoroughly ripe. It is then shaken or picked off, and put into tubs, where the pulp is washed off until the stones are perfectly clean. They are then spread out on boards, and turned over occasionally until dry, when they are put away in boxes, mixed with sand very slightly moist. A layer of sand is spread in the bottom of the box, then a thin layer of the stones; next a layer of sand, and so on until the box is full. The boxes are secured against vermin, and put away in a cool, dry place, until needed for planting. If not planted in the fall, they may be wintered in a cellar, or out of doors, protected from rain by boards or other covering.

When to Plant.—If circumstances were favorable, all seeds would be better planted in the fall, or immediately after their maturity. Nature, in her course, indicates this to be a general law; but in cultivation, this must depend on circumstances. The ground may not be in readiness. It may be so wet and heavy, that seeds would be so saturated with moisture during the winter as to lose their vitality, or the ground might become so beaten down and compact with fall, winter, and early spring rains, as to make it almost impossible for the young plants to make their way through it. All these things are to be considered in deciding the proper time to sow seeds. If

the soil be very light and porous, cherry seeds may be sown as soon as gathered; if the contrary, it should be deferred until spring; but they germinate early, and at a low temperature, so that it is necessary to keep them pretty dry and cool, and get them into the ground at the earliest practicable moment. We find it quite difficult to keep them properly, and yet prevent them from germinating before the ground is dry enough to receive them.

How to Plant.—For cherry seeds the ground should be *light*, in a good, fertile state, but not strongly manured. The seeds are sown in drills, as recommended for apple and pear seeds; and so thin as to give each plant space to grow in, without being crowded by others. In this way, and with clean summer culture, the stocks will all be large enough, at the end of the first season's growth, to be taken up and prepared for planting in nursery rows the following spring.

4th. *Stocks for the Peach.*—As a general thing, the peach is worked on its own stocks in this country. The stones should be stratified during the winter, by being placed in boxes, with alternate layers of sand, or light earth, and be kept in a situation exposed to the frost; unless this is done, they will not germinate the following spring; they require more moisture and exposure to open their hard shells, and induce germination, than any other fruit seeds. They should be examined a week or two before planting time, and if they exhibit no signs of vegetation, more moisture should be given them; if they have been kept dry for a month or two before being stratified, they may require to be cracked. Nurserymen have an instrument for this purpose, resembling nut-crackers, which operates with great rapidity. When cracked, they may be mixed with moist earth, and germinated in a warm place. The growth of every one so germinated can be depended on, and the rows will be regular. As the seeds are planted where the trees remain until trans-

ferred to the garden or orchard, it is a very good plan to nip off the point of the young root protruded from the seed; this makes it ramify, so that, when taken up, the trees have fine branched and fibrous roots, instead of long tap-roots, as is very generally the case.

Planting.—The seeds should be put in the ground as soon in the spring as it is in a fit state to be worked, or as soon thereafter as possible. A line is stretched, and holes made with a dibble to receive the seed; it should be put in with the root downwards, and be covered not over one-fourth of an inch deep.

Plum Stocks are used for the peach in soils of a stiff, adhesive character, in which the peach does not succeed. In England, the peach is worked almost exclusively on the plum, as it suits their moist climate and soil better. In France, the hard-shell almond is used almost exclusively on *dry*, and the plum on damp soils. Almond stocks are raised in the same way as the peach.

Dwarf Peach-Trees are produced by working on the same stocks recommended for dwarfing the plum. Some time ago, a French journal gave a very interesting account of experiments made in dwarfing the peach and plum, by a Dr. Bretonneau, of Tours, France. He had succeeded in producing very pretty dwarf plum and peach-trees on a dwarf plum, indigenous to this country (*Prunus pumila*). He exhibited beautiful prolific dwarf trees of the Green Gage plum on the sloe, and was making farther experiments with the dwarf almond as a stock for peaches.

These subjects are all worthy the attention of those who have the leisure for experiments. The art of growing a large collection of fruits on a small spot of ground is of great importance to curious and tasteful people living in towns and villages.

Stocks for the Apricot and Nectarine.—Everything that has been said of peach stocks applies, with equal force and propriety, to these two trees.

5th. *Stocks for the Plum*.—It is difficult, in this country, to get good plum stocks. If seeds be taken promiscuously from any variety that is to be had, as is done with most other trees, the probability is that, of the seedlings, not one in 500 will be suitable for a stock. I have seen bushels of seeds planted that were said to have been collected from strong growing trees; but out of the tens of thousands of seedlings produced from them, not 100 were ever worked, or fit to be. It is not only necessary to obtain seeds from vigorous-growing, healthy trees, but from a species or variety that reproduces itself from seed.

The *Horse Plum*, an oval, purple, freestone sort, with vigorous downy shoots, reproduces itself from seed, and makes good stocks. On a suitable, well-prepared soil, its seedlings often attain two feet or more in height in one season, and are then fit for the nursery rows. They require a rich, substantial soil, prepared as recommended for pear seeds. Other vigorous sorts have been recommended in various parts of the country, but, on trial, they have been found quite inferior to the horse plum, and, as a general thing, worthless. The "black-knot," a fungus which infests the plum, is now so prevalent in this country, that we regard it as unsafe to take seeds promiscuously gathered; hence we now import our plum stocks from Europe, where this disease does not exist. It is doubtful, however, whether the seed will inherit the disease, but it is well to be on the safe side.

The *Canada*, or *Wild Plum*, which abounds in Ohio, Michigan, and other Western States, is a distinct species, and reproduces itself from seed. Some of the seedlings grow extremely rapid, making fine stocks, in one year, on any good soil. They continue in a thrifty, growing state until late in the autumn; but they should not be worked above the ground in the usual way, as their growth does not keep pace with the species to which most of our cultivated sorts belong. The best way to manage

them is to take the yearling seedlings, whip-graft them on the collar, and set them out at once in the nursery rows; they will make good trees for planting out in three years. The stock is all below the surface of the ground, and, in time, the graft sends out roots, and becomes, in a great measure, independent of the stock. Where the seedlings are not large enough for grafting the first season, they may be set out in the nursery, and allowed to grow one season, and then the earth can be removed from the collar until the graft is inserted, and then drawn up. This we find, by later experience, the better method, and practice it exclusively. To procure strong stocks for standard trees, of weak-growing sorts, like the *Green Gage*, such thrifty varieties as the *Imperial Gage* and *Smith's Orleans* may be grafted on this native species, and in two or three years they will make stocks strong enough for any purpose. The French use several natural species that are produced from seed—the *St. Julien*, large and small (Brussels of the English), and the *Damas noir*, large and small. The first is generally used for stocks for apricots and peaches as well as plums. We find none of these superior in vigor to the horse plum, but they are worked more successfully. In England, the *Brussels*, *Brompton*, and *Muscle* stocks are used, propagated from both seeds and layers. For *small-sized garden trees*, either dwarf standards or pyramids, the cherry plum, “*Myrobolan*” of the French catalogues, makes a very good stock.

It is a natural species, and can, therefore, be produced true from seed. It maintains a vigorous growth all summer, and may be worked in July, August, or September. It may also be propagated from layers.

The *Sloe* is also used to some extent where very small trees are wanted; and we have no doubt some native species, as, for instance, the *Beach* and *Chickasaw* plums, which are small trees, will make good dwarf stocks. Handsome

small-sized garden trees may be raised on the smaller kinds of the Canada Plum. The first year's growth, and even the second, is quite vigorous on them; but after that the vigor diminishes, and the trees become quite prolific. This and the Cherry Plum are principal stocks for dwarfing.

Plums for seeds should ripen well on the tree; they are then gathered, the pulp washed off, and the seeds dried and put away in boxes of sand, in alternate layers, as recommended for cherries. They may be sowed in fall or spring, as circumstances, already mentioned, will admit.

Nearly all plums used for stocks may be propagated by layers. Mother plants, or stools, are planted out and cut back as recommended for Paradise, etc.; the shoots of the previous season's growth are pegged down flat in the spring, and two inches of earth drawn over them. Every bud on these layers will produce a shoot that, generally, will be well enough rooted in the fall to be separated from the stool, and planted out into nursery rows the following spring. These layered shoots are cut off close to the old plant, and the upright shoots produced during the previous season may be again pegged down.

The stools, or mother plants, managed in this way, require the best treatment to maintain their vigor, that a supply of strong shoots may be produced every season fit to lay down in the spring. Weak, slender shoots, unfit to layer, should be cut out early in the season, to aid the growth of those intended for use.

SECTION 3.—TRANSPLANTING STOCKS.

This comprehends three separate operations—*taking up, dressing or pruning, and replanting*; but before touching on the details of these operations, it may be well to consider

1st. *The age at which Stocks should be transplanted.*—On this point there seems to be a diversity of opinion.

The very general one is, that they should remain where they have been propagated until they are large enough to be worked ; a great many plans are, therefore, suggested for wintering seedlings, and especially the pear. The experience of the best cultivators everywhere is, that seedling stocks in general should be transplanted when *one year old*. It may be urged against this that some seedlings are so small when one year old, as not to be worth transplanting ; so feeble, that more care and culture would be required, before they could be worked, than they are worth. In reply, it can only be said that such feeble productions are only fit to be *thrown away* ; because the seeds must have been defective, or the soil and culture bad ; and stocks raised from poor seeds, or stunted by bad soil and culture, will never make sound, healthy, vigorous, nor long-lived trees. There may be some exceptions to this, but the rule will generally hold good.

When seedlings remain longer than one year in the seed-bed, they grow up slender and weak ; one more vigorous than its neighbors will ruin all around it. Then the roots do not ramify, but continue to lengthen, without forming laterals or fibres ; and when removed, and reduced to the necessary dimensions, they receive a severe check ; but at one year the check is very light ; they at once form lateral roots, and instead of being drawn up tall and slender, they become stout and well-proportioned. The best pear-growers in Europe, and even in this country, would scarcely take, as a gift, two-year seedling pears from the seed-bed, unless in case of absolute necessity.

The proper plan is to take up all *seedling stocks*, and all *layers* sufficiently rooted to bear separation from the stool, and all *cuttings* that stand close, *at one year old*, and sort and arrange into separate classes, in this way : in one class put the strongest, those fit for immediate use, either to be grafted on the root, or set in nursery rows, and be budded the summer following ; in another class, put such as may

require to stand one year in the nursery rows, to be fit for working; and in the third class, such as are too weak to be put in the nursery rows, but will require to be "bedded out;" that is, set closely in beds by themselves, where they can remain for one or two years, until they are large and strong enough for root grafting or for the nursery rows. Unless in the case of stocks scarce and difficult to procure, this third class had better be thrown away at once; as it will cost as much to nurse them as to raise fine stocks from the seed.

2d. *Time to take up.*—There is but one proper time to take up all seedlings and rooted layers for stocks, and that is the fall; and for several reasons. The first is, they are all liable to injury by the frosts of winter; seedlings have no side roots to hold them in the ground, and layers are near the surface, so that the freezing and thawing draw them up; the roots are thus exposed, and seriously injured. The second is, they can be dressed during the winter in the cellar, and be ready for planting in the spring. When taken up, they can be laid closely in by the roots in the soil, in a dry place, and covered over so as to exclude frost. When out-door work is over, they can be uncovered, taken into the cellar and dressed, and carefully laid in again by the roots, in the same place, which should, of course, in the mean time, be protected from frost. The third reason is, that when seedlings are taken up in the fall, the ground can be prepared for another crop; and this is of considerable importance. In the case of layers, the stools or mother plants can be manured, dressed, and put in order for another season's growth; and this, also, is important. Such are some of the advantages, or, in fact, the necessities of taking up stocks in the fall. In the case of the quince, however, it frequently occurs that, when the layers have been removed in the fall, a severe winter kills the stool plants, unless well protected with a covering of earth.

3d. *How to take up.*—Seedlings are very easily taken up, in two ways, without in the least mutilating the roots. If one person does the work, he should begin at one end of the row, and, with a common spade, or, which is better, one with three strong prongs, a foot long and an inch and a half wide, dig under the plants without cutting the roots, and, as fast as they are loosened below, pull them out; and in this way proceed. Another and quicker way is, for two men to loosen the plants, each on opposite sides of the row, inserting a forked spade as deep as the roots go, while another follows and pulls out the plants. When the ground is quite soft, this way answers very well; but if dry, or hard, the first is better.

In nurseries where very large quantities of seedlings are to be taken up at once, a "Tree-digger" (see *Implement*s), drawn by horses, is used. The "digger" passes under the row at a depth sufficient to avoid injury to the roots, and loosens them so that they can be readily pulled, either the whole, or a part.

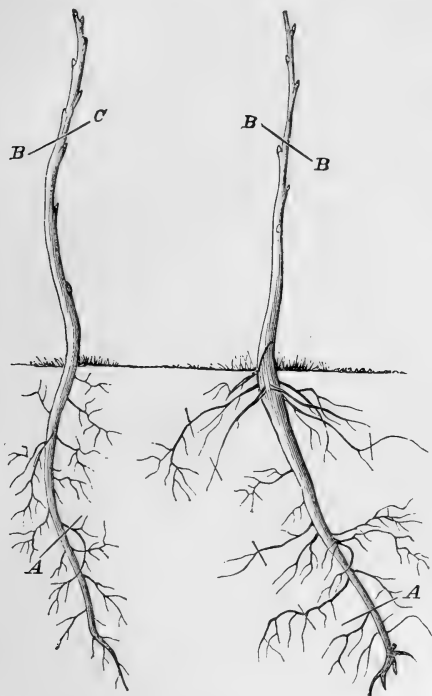
Layers require more care and caution. A trench must be opened all around the layered branches, deep enough to go quite below the roots, and in an oblique manner, so as to undermine them. Where the branches are pegged down, the pegs must be taken out, and the layer is then separated between the rooted part and the stool, and gently taken from the earth. Especial care must be taken not to split those that have been layered by incision; their removal must be done slowly and cautiously.

Mound Layers are easier separated; the earth is simply removed from the base of the rooted branches, and they are then separated within an inch or so of the stem.

Layered Branches.—When the young rooted plants are produced from the eyes of a buried shoot or branch, the pegs are removed, the whole branch dug under, and completely loosened and separated from the stool; the young plants are then taken off, one by one, close to their base.

4th. *Pruning, or Dressing Stocks.*—The objects always in view, in performing this operation, are—to remove injured or broken roots; to reduce the tap-root, that it may produce laterals; to reduce the stems to a proper proportion with the roots, and put them in a condition that will insure a vigorous growth.

Seedlings, taken from the seed-bed, have always a long tap-root, with few or no laterals; and as trees with such roots are unfit for safe transplantation, it is necessary to take measures to change their character. We therefore remove the small tapering portion of the root, as at fig. 86,



Figs. 86 and 87.—SEEDLING STOCKS AND CUTTINGS.

Fig. 83, a seedling stock, one year's growth, as it comes from the seed-bed; the line at *A* shows the shortening of the tap-root; that at *B*, the shortening of the stem before replanting. Fig. 87, a quince cutting; the cross lines on the stem and roots indicate the pruning before replanting.

of the ground. The pear roots, especially, are inclined more to descend in a straight line than to spread; and

unless they are well cut back when young, they are always difficult to transplant safely afterwards. Roots that descend like the prongs of a fork are usually destitute of fibres, whilst those that spread out horizontally, or near the surface, are well furnished with fibres, that not only make trees easily transplanted, but inclined to early fruitfulness. This operation on the roots, it is obvious, destroys the natural balance or proportion that existed between them and the tops. Hence the necessity for shortening the stem in a corresponding manner. But even if the roots were not shortened, the stems should be, in order to obtain a vigorous growth. The very removal of the plant lessens the power of the roots to absorb and convey nutriment; and on this account, if no other, the stem should be reduced by way of regulating the supply and demand. We sometimes see young stocks planted out without any shortening of the stem; and the result is, they scarcely make any growth the first season—the roots are barely able to absorb enough to keep them alive. If one-half the stem had been cut away, the remaining buds would have received such a supply of food as would have produced a vigorous growth. It is a pretty good rule, therefore, to reduce the stems of seedlings *one-third* to *one-half*, as at *B C*, fig. 86. But there are exceptions to this. For instance, a stock with a very large and strong root, and a short, stout, close-jointed stem, well matured, and furnished with plump, prominent buds, requires very little, if any, shortening of the stem; and again, others are just the reverse—tall, slender, and feeble, having been suffocated in the seed-bed. Such as these require to be shortened more than *half*, perhaps *two-thirds*.

Layers, or Cuttings (fig. 87), are in a different situation from seedlings, and require, therefore, different treatment. They have no tap-roots, but masses of fibres; and these fibres, being more or less injured by exposure, should be

cut off, to make way for new ones. The shortening of the stems depends entirely on the size and condition of the roots. If well rooted, and the roots be in good condition, they may be left a foot long; if poorly rooted, they should be cut back to six or eight inches. This applies equally to the layers of the *quince*, *Paradise*, *Doucín*, *plums*, etc.

5th. *Planting stocks in the nursery rows where they are to be budded.*—The first consideration which this operation suggests is the *condition of the soil*. Under the head of soils, sufficient has been said respecting the modes of *deepening*, *draining*, and *enriching*; and it is only necessary to say here that, where stocks are planted, the soil should be at once *deep*, *dry*, and *rich*; for no such thing as sound, vigorous fruit-trees can be raised on a poor, shallow, or wet soil. The various means of improvement have been already pointed out and explained. It may, however, be well to remark that ground may be *too rich*, and induce a rank, watery growth, that would either result in death at the final transplanting into the garden or orchard, or in a very feeble and sickly growth after it. We see frequent illustrations of this in the case of trees raised in old, worn-out nurseries, where rapid growth has been *forced* by powerfully-stimulating manures, and in rich alluvial prairie soils and river bottoms. These rank, pithy, soft productions, are very attractive to the eye; but they suffer so much by removal, no matter how well treated, that they seldom fail to disappoint the planter. Manures used should be well decomposed, and incorporated with the soil, if possible, the autumn before planting. A tree is not like a cabbage or lettuce. The tenderness and succulency of these constitute their great merit; but the wood of a tree must be *firm*, *short-jointed*, and *mature*; and these requisites are always attained by a moderate and natural, not a *forced*, growth.

Planting each species in the soil best adapted to it.—Where there are different characters of soils in a nursery, to be planted with a general assortment of stocks, it is important to give to each that which is best adapted to its nature; thus the pear, apple, and plum should have the richer, deeper, and more compact, or that with most clay. The plum, in particular, succeeds well on a pretty stiff clay. The cherry and peach should have the lightest and warmest. The *quince*, the *Paradise*, and *Doucin* do not require such a *deep* soil as the pear and the common apple seedlings, because their roots are fibrous, and always remain near the surface; but it must not be inferred from this that a *shallow* soil suits these best.

6th. *When to Plant.*—In parts of the country where the winter is long and severe, or where freezing and thawing are frequent, fall planting cannot be successful; as the plants, having no hold of the ground, are drawn out and injured; and besides, if the ground is somewhat clayey and tenacious, the heavy rains that occur early in the spring will make it so compact that air will not penetrate it, and the young roots will form slowly and feebly. When neither of these difficulties is to be feared, fall planting is decidedly preferable. Spring planting should be done at the earliest moment the condition of the ground will admit; which is, when dry enough to crumble into fine particles when turned over with the spade.

7th. *Distance to Plant.*—We are all in the habit of planting quite too closely in the nursery; the consequence is that the trees are not well proportioned. Frequently, the standards are as large at six feet from the ground, as at the collar; weak, and top-heavy, so that sticks have to be used to support them, even when four years old. *Pyramidal trees* are out of the question where such close planting is practised—the growth is always forced to the top. Nature gives us numerous and striking illustrations of the effect of close planting. We see, in a natural group or

thicket, trees running up forty or fifty feet, of an equal diameter, and without a branch; and if one such tree were left exposed, by the removal of those around it, the first, high wind would blow it down. On the outskirts of this group or thicket, or perhaps completely isolated, in the center of a field, we see another tree of the same species branched almost from the ground, with a diameter at the base twice as great as at half its height, and tapering upward with beautiful regularity, capable of resisting a hurricane. To raise stout, well-proportioned trees, we must give them plenty of room, that they may have the advantage of air *all around*, and not *at the top* only.

There is scarcely a nursery to be found in which the trees are not grown too close—three or four on the space that one should occupy. There is, to be sure, great economy in close planting; for five hundred trees can be grown on the space that one hundred should occupy, and with nearly as little labor; but it would really be better for people to pay twice or three times as much for their trees, if grown so far apart that the air and light would have free access to them in all parts, and give them stout, well-proportioned forms. A reform in this respect is much needed; but it cannot be expected until purchasers become discriminating and intelligent on the subject.

The distance at which stocks should be planted in the nursery rows is governed entirely by circumstances. If it is intended to use a cultivator between the rows, they should not be less than *three and a half feet* apart. If spade and hoe culture be intended, two and a half to three feet will be sufficient. Where the trees are to be removed at the age of one year, one foot apart in the rows is sufficient; but if they are to remain until two, three, or four years, they should be eighteen inches to two feet. If removed at two years, eighteen inches is enough; but where standards remain three or four years, until they have heads formed, and pyramids remain until they have

formed two or three tiers of lateral branches, two feet, or two and a half, is little enough. Indeed, when pyramids remain for three years, there should be a clear space—three feet—on all sides. The usual nursery practice is, rows three and a half feet apart; trees in rows, one to one and a half feet apart.

Dwarf standards require less space than full standards, and dwarf bushes still less. The stocks intended for these different classes of trees should be planted separately. In sorting the stocks, at the time of dressing, the larger should be used for full standards, and the smaller for low or dwarf standards.

8th. *Mode of Planting*.—The square or plot of ground for each class of stocks being ready, a line is stretched along one side, and a trench opened with the spade, deep and wide enough to hold the roots; the plant is then held against the side of the trench, next the line, by one man, whilst the earth is filled in by another; when about half the earth is in, it is trodden down pretty firmly by the foot, and the remainder filled in. As buds are usually inserted on the north side of the stocks, they should incline, if at all, slightly to the south. Good pulverized surface soil should always be put upon the roots, to induce the immediate formation of young fibres. During the planting, the roots must be carefully guarded from exposure. A few only should be taken out of the ground at a time. When there are but few fibrous roots, puddling in thin mud is useful, otherwise not. Some nurserymen open the trenches with a plow instead of the spade; and some plant all kinds of stock with the dibble. We do not practise either.

Planting Root Grafts.—The quickest mode of planting small root grafts is to stretch a line along the ground to be planted, and, with a dibble, make the holes, and press the earth in around the plants. This dibble should be twelve to eighteen inches long, about two inches in

diameter, pointed and shod with iron. Fig. 88 represents one made of the handle of a spade. Figure 89 shows a dibble, such as is sold by the dealers in implements. It is made from a stick, with a natural curve at one end, to conveniently fit the hand, and is furnished at the other end with an iron point. One person will plant as many in this way as four could by opening trenches with spades. But where the plants are dibbled in, the ground must be in the best condition—perfectly dry, and finely pulverized.



Fig. 88.—
DIBBLE
FOR
ROOT-
GRAFTS.

Fig. 89.—
DIBBLE.

Treatment of Stocks after Planting.—The principal care which stocks require between the time they are planted and the time they are budded is to keep the ground about them clear of weeds, and in a friable, porous condition on the surface, by frequent stirring. A good rule is to run the cultivator or horse-hoe through them once a week. The success of budding depends, in a great measure, on the condition of the stocks. They *must* be in a thrifty, growing state, and this can only be obtained with good treatment. Having now considered, in as much detail as seems necessary, the propagation and transplanting of *stocks* into the nursery rows, we proceed with

SECTION 4.—THE BUDDING, GRAFTING, AND MANAGEMENT OF TREES IN THE NURSERY.

The simplest and clearest method of treating this part of the subject, seems to be that of considering, separately, each year's operations in succession.

THE FIRST YEAR.—Strong yearling seedlings of the *apple*, *pear*, *cherry*, and *plum*, say one-fourth of an inch and upwards in diameter, and well-rooted layers of the

quince, *Paradise*, and *Doucin*, of the same size, planted in the spring, in a good soil, and kept under good, clean culture, will, as a general thing, be in a fit state for budding in July, August, or September, following. The budding may, therefore, be considered as the first season's work. The details of this operation may be divided for consideration as follows:

1st. *Time for Budding.* 2d. *Preparation of the Stocks.* 3d. *Insertion of the Buds.* 4th. *Untying.*

1st. *The time for budding* each species or class of fruits depends upon its habits of growth. Such as cease to grow early in the season, must be budded early, as soon as mature buds can be had; because it can only be done while the stocks are in a free, growing state, full of sap. Such as grow until late in the autumn, must be budded late, otherwise the new layers of wood, formed after the insertion of the bud, would grow over and destroy it, or the bud would be forced into a premature growth towards autumn, which, in fruit-trees, should always be avoided. The common sorts of plum terminate their growth early in the season, and are therefore budded early, whether with plums, peaches, or apricots; at Rochester, usually about the last of July, or beginning of August. The native or *Canada* plum, and the *Cherry* plum (*Myrobalan*), grow freely until late in the fall, and may be budded in the latter end of August or beginning of September. *Pears* on *pear* stocks are usually budded here in July, in anticipation of the leaf-blight, which stops their growth when it attacks them. Where no such thing as this is apprehended, they should not be budded before the middle of August, as the buds are not generally mature until that time. *Apples* on free stocks, and on the *Paradise* and *Doucin*, may be budded as soon as the buds are mature, which is usually, here, about the first to the middle of August. *Cherries* on free *Mazzard* stocks, as soon as buds are ripe; here, about the first of August. *Pears* on *quince*,

and *Cherries on Mahaleb*, about the first of September, and from that to the middle of the month; as the quince and Mahaleb grow late, especially the latter. Peach stocks should always be budded the same season the seeds are planted, and, as they grow rapidly, until very late, are not usually budded until between the first and middle of September. The budding period varies in different seasons. In a dry, warm season, the young wood matures earlier, and stocks cease to grow sooner, and are, therefore, budded earlier than in a cool, moist season, that prolongs the growth of the stocks and retards the maturity of the buds. Stocks growing feebly, require to be budded earlier than those growing freely. It is necessary to keep an eye to all these points.

The destruction of insects must be strictly attended to. An army of *slugs* may devour the foliage of the pear and cherry, and even the plum, in a day or two, and prevent their being worked that season. The *aphis*, too, frequently appears in such multitudes as to check growth. Dry lime or ashes thrown on the slugs, will kill them; and strong soap-suds, or tobacco water so strong as to assume the color of strong beer, will kill the *aphis*.

2d. *Preparation of the Stocks*.—This consists in removing such lateral shoots from the stock as may be likely to obstruct the insertion of the bud. Our practice is to do this at the moment of budding, one person doing the work in advance of the budders. If done a few days previous, and several shoots are removed, it checks the growth of the stocks, and they do not work so well. It might answer very well to do it two or three weeks previous, so that they might recover from the check before being budded.

3d. *Insertion of the Bud*.—Having treated so fully of the manner of preparing and inserting the buds in the article on budding, nothing farther need be said on these points here.

In free stocks, the bud should be inserted within three or four inches of the ground.

In some parts of the West—Wisconsin, Illinois—and some other places, certain rapid, late-growing, and rather tender varieties are liable to be winter-killed if budded close to the ground; probably by the sudden thawing of that part, caused by the reflection of heat from the ground. In view of such a difficulty, it may be well enough to bud sufficiently high to avoid this, provided a stock known to be perfectly hardy can be obtained; but, as a general thing, low budding makes the best trees. All dwarf stocks should be budded as close to the surface of the ground as it is possible; and even some of the earth may be removed and put back when the budding is done. The necessity for this lies in the fact that all dwarf stocks should be wholly below the ground when finally planted out in the garden or orchard.

4th. *Untying the Buds*.—In ten days or a fortnight after the buds are inserted, they should be examined, and such as have failed may be budded again if the stocks continue to grow. In some cases, it may be necessary, and particularly with cherries, to loosen the buds and tie them over again; as rapid growth will cause the string to cut the bark before the bud has completely united, or is fit to be untied. This seldom occurs, however; as a general thing, the strings may be removed in three weeks to a month after the budding; and they should never be left on over the winter, as moisture lodges around them, to the detriment of the bud. As soon as the budding is done, the ground should be worked over with the cultivator or forked spade. The first season's management of stocks too small for budding consists simply in keeping the soil clean and mellow, and in guarding against the attacks of insects.

The treatment of *root grafts* the first season consists in clearing and loosening the ground, the removal of suckers

from the roots as fast as they appear, and pinching early any strong side shoots likely to weaken the leader.

SECOND YEAR.—Where the buds failed the previous season, the stocks should now be whip-grafted near the surface of the ground. They will be but little behind the buds, and will make nearly as good trees, if neatly done. Plums and cherries must be done before, or as soon as the buds begin to swell (say in March, here); pears and apples may be done later. The *second-sized stocks, planted last season*, and intended to be budded this, should, if in a feebly growing or stunted condition, be cut back to within two or three inches of the surface of the ground. This will give the roots new vigor, and thrifty shoots will be made, by budding time, that will work more easily and successfully than the old stock. In a month or so after being cut down, all the shoots but the strongest one should be removed. The *stocks budded last season* are headed down to within three or four inches of the bud, just as the leaves are beginning to appear; and all buds starting into growth on the stock, either below or above them, are rubbed off.

Treatment of the growing bud consists in keeping all shoots that appear on the stock rubbed off. If side shoots appear early, and are likely to contract the growth of the leader, they should be pinched off. Any that assume a reclining or crooked habit should be tied up to the stock, or to a support, which may be a wooden pole, four feet long, sunk a foot in the ground, at the root of the stock; both the stock and growing shoot should be fastened to it (fig. 90), but not so close as to impede the growth. This is only necessary with certain weak, irregular growing sorts. In August, the portion of the stock left above the bud, at the heading down in the spring, should be removed with a sloping cut, close and smooth, as at A (fig. 90), at the highest point of union between the bud and stock. The new layers of wood made after this time

cover the wound before growth ceases in the fall. Side shoots, when they appear, must be checked, if too vigorous, by pinching off their ends, but not entirely removed, as they assist in giving size and strength to the lower part of the body of the young tree. The peach almost



Fig. 90.

A young budded tree in its first season's growth, supported by a stake. The line at *A* indicates the cutting away of the stock close to the bud.

invariably produces numerous side branches the first season, and it is a very common but very erroneous practice to prune these all off in midsummer. The proper course is to maintain a uniform vigor amongst them by pinching, and to prevent any from encroaching on the leading shoot; in this way we get stout, well-proportioned trees. This brings us to the end of the second year, and gives us young trees of one year's growth. *Peach trees* should always be planted out at this age, and all trees intended for training in particular forms; but as this part of the subject will be considered under the head of "*Selection of Trees*," we will proceed to the course of management for the

THIRD YEAR.—We commence this year with trees of one year's growth, and the first point is to determine what *form* is to be given them—whether *tall* or *dwarf standards*, *pyramids*, *bushes*, or *espaliers*. Having settled these matters, we have but to follow up the proper course to accomplish the desired ends. It may be well to take each of these forms in succession, and point out the necessary management under various circumstances.

1st. *Standards*.—Until very lately, trees of all sorts, and for every situation, were grown as tall standards, with naked trunks, six, and even *eight feet* high. Indeed, it appeared as though an impression existed amongst people that a tree was not in reality a tree, nor worthy of a place on their grounds, if it had not this particular form. Lat-

terly however, since fruit-tree culture has become more practised, and somewhat better understood, this impression has been gradually losing ground, and in all parts of the country low trees are finding advocates.

Experience is beginning to teach people that, whilst tall standards in an orchard possess the single advantage of admitting the operations of the plow under the branches, low standards are much more secure against the numerous fatal diseases that attack the trunks, are much more accessible for the performance of all the necessary details of management and for the gathering of the fruit, and are less exposed to damage from high winds.

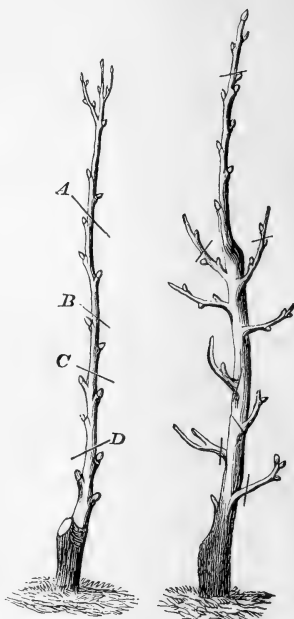
These are all very important advantages, certainly; but the most important one is the safety of the tree against diseases of the trunk. In all parts of this country we have a powerful sun in summer, and in winter and spring sudden and violent changes from one extreme to another; and experience has shown that the trunk and large branches, being fully exposed to all external influences, are generally the parts first attacked with disease. Cultivators are, of course, at liberty to choose for themselves; but, except to meet the wants of some particular circumstances, no standard tree should have a branchless stem above *five feet* in height; *four* is preferable for all, except orchards of common apples for cider or stock. Trees with heads only four feet from the ground are always easy of access, and the natural spread of the branches affords a great protection to the trunk at all seasons. Nurserymen should by all means encourage, by precept and example, the cultivation of low-headed trees.

Starting with the yearling trees for standards, we examine the habit of the variety, whether stout or slender; whether branched, as many varieties are the first season, or without branches. Before proceeding to the operation of cutting down to increase the size of the trunk, the reader is referred to the principles and prac-

tices of pruning in the first part of the work. (Part I, Chapter V.) No pruning should be attempted for the attainment of any special purpose without having first carefully studied these.

If slender, and without side branches, as in fig. 91, they should be cut back twelve to twenty inches, as at *A*; this removes the buds that would push first, and retains the sap in the lower parts, which will give a stout body. The taller and more slender the tree, and the smaller the buds, the farther it becomes necessary to cut back. In fact, some very feeble-growing sorts must be cut back until within a foot or less of the base. During the summer, trees cut back in this way may produce lateral shoots on the greater part of their length. These must not be pruned off, but kept in a uniform size and vigor by pinching any that threaten to exceed their proper bounds. The shoots immediately below the leader must be watched, as they are always inclined to push too strongly.

A tree thus cut back, and the side branches regulated by pinching, will, in the fall, have a stout body, and present the appearance of fig. 92. Where the yearlings are short and stout, and are furnished with a few lateral



Figs. 91 and 92.

Fig. 91, a yearling tree; to the bud *A*, indicates the cutting back to make a stout stem for a standard; *B* and *C*, the cutting back for pyramids or low standards; *D*, the cutting back for dwarfs or espaliers. Fig. 92, a young tree once cut back to form trunk for a standard.

shoots, cutting back may be unnecessary. The largest of the side shoots may be pruned off wholly; and the small ones left to retain the sap in the lower part of the stem, at least until midsummer, when new ones will have been produced. There are certain stout-growing, branching varieties of all the fruits that require no shortening, and very little pruning of any kind, to form stout trunks, when not planted too close.

Dwarf Standards.—The management of yearling buds to produce these, is similar to that described for standards, varying it always to suit the particular habit of the species or variety; tall, slender-growing sorts require cutting back, and the suppression of branches at the top; but many varieties of cherries and plums, some very stout-growing pears and apples, and all apricots and peaches, may commence the formation of heads this season. The stem is cut at the point desired, two to three feet from the ground, to form the head on; and three or four of the stoutest shoots, growing in opposite directions, are preserved, whilst all others, close to them, are pinched off when two or three inches long; side branches are allowed to remain that season on the stem to strengthen it, but they are kept short and regular by pinching. In the fall these trees will be fit for the final planting out, whilst those of weaker habit will require another season, if heads are wanted.

Pyramids.—Yearling trees, intended for pyramids, are cut back so far as to insure the production of vigorous side branches within six or eight inches of the stock. The habits of growth of the species and variety must be carefully taken into account. Some are disposed, from the beginning, to form lateral branches; and others require vigorous measures to force them to do so. As examples, the Bloodgood pear is very much inclined to branch the first year, whilst the Louise Bonne de Jersey and Duchess d'Angoulême seldom do so, unless in some way the grow-

ing point be checked. So it is in cherries; most of the Dukes and Morellos are inclined to produce laterals the first season; but the free-growing sorts, *Hearts* and *Bigarreaus*, rarely do so, unless the point is checked early in the season. So it is in all the fruits, and therefore no general rule can be given; but the appearance of the tree indicates the treatment required. Where we see side branches *naturally* produced the first season, we at once conclude that the buds are well disposed to break, and the cutting back may be comparatively light. Where no side branches are produced, we must be governed by the appearance of the buds on the lower part of the tree, where it is desired to produce the lower branches; if they be small and flat, it will take close cutting to arouse them; but if plump and prominent, less vigorous measures will be necessary. In the case of short, stout, and branched yearlings, a few of the best placed, lowest, and strongest branches are reserved, whilst the others are entirely removed. We then shorten the reserved branches according to their position, leaving the lowest the longest. The leading shoot is shortened, so that all the buds left will be sure to push and form shoots. When these have attained the length of two or three inches, the strongest and best placed are selected for permanent branches, and the others are pinched off.

Yearlings that have no side branches (fig. 91), we generally cut back one-half, as to *B*, and, in many cases, two-thirds, to *C*, in order to obtain strong branches near the ground. Almost every bud, below the one we cut to, should push; and when shoots of two inches or so are made, we select two, three, or such number as may be wanted, of the strongest and best situated, to be reserved, and pinch the others. It very generally happens that two or three buds next below the one we cut to, push with such vigor as to injure both the leading shoot above and the side shoots below them. They must be watched, and

pinched as soon as this disposition becomes obvious. Yearling trees managed in this way will present, in the fall, the appearance of fig. 93.

Purchasers are very apt to favor *tall* trees even at the expense of their forms; and nurserymen, even those who



Fig. 93.

Fig. 93, a two-year-old tree cut back once, and intended for a pyramid. The cross lines indicate the second cutting back.

know better, with a view to suiting the tastes of their customers, rarely cut their trees back sufficiently to make pyramids. The first branches are seldom less than two feet from the ground, and it is quite difficult to make real pyramids of such trees afterwards; at all events, it incurs a great loss of time, for the whole of the branches and half of the stem must be cut away to produce the required form.

Dwarf Bushes.—The apple on Paradise is generally grown in this form—with six to twelve inches of a stem, and spreading heads. The Morello cherry, and the cherry, or Mirabelle plums, and many kinds of pears, may be grown as dwarf bushes, if desirable. The stocks must all be of a dwarf character.

Plants, from which the strongest have been selected for dwarf standards and pyramids, will make very good bushes. The branches being so near the root, renders a less amount of vigor necessary. Very strong yearling plants may be allowed to form heads the second year, but such as are *very* slender, will require cutting back and another season's growth before the head is allowed to form; and they will require a similar course of treatment as has been recommended for standards and dwarf standards. No matter what the

character of the tree is, a *stout stem* is necessary; and, although the measures taken to obtain this seem to require, in some cases, a loss of time, still there is a gain in the end; for trees allowed to form heads before the stems are amply sufficient to support them, require a great deal of extra care after planting out, and a course of shortening back, that offsets the temporary advantage of forming the head a year sooner. This holds good in all cases. The mode of forming the heads of dwarf bushes is similar to that described for standards.

Espalier Trees.—These have a few advantages peculiar to themselves, which will be explained under the head of “the selection of trees for the garden.”

To form espaliers, yearling trees are usually chosen, planted in the place where they are to remain, and cut back to within four or five buds of the stocks, as at *D*, fig. 91; these buds break and produce shoots, from which the strongest are chosen to form the arms, and the others are rubbed off.

The peach grows so vigorously that, if the growing bud be checked when a foot high, it will produce side shoots, from which two may be selected from the main branches of the espalier, and thus a year will be saved. Another way is to insert two buds, one on each side of the stock. Very nice espalier trees may be grown in the form of a pyramid, with a main stem and lateral branches, the lowest being the longest. I have seen the pear grown in this form very successfully. Trees for this form require the same management as pyramids, except that the branches should be placed opposite on *two* sides. This brings us to the end of the third year, and the trees are now two years old from the bud. At this age we take it for granted that all trees on dwarf stocks for *pyramids*, *dwarfs*, and *espaliers*, and all standards even, of the peach, apricot, and nectarine, and, in most cases, the cherry and plum, will be finally planted out. Standard

pears and apples are almost the only trees that require to be left longer in the nursery; and their management during the third and fourth years of their growth, if allowed to remain so long, will be similar to that described for the second. In the spring, February, or March, the leading shoot is cut back, in order to increase the stoutness of the stem as it advances in height; and, during the summer, the side shoots are kept of uniform length and vigor by pinching. The lower side branches are removed gradually, every season, as the tree becomes strong enough to dispense with them. As it has been before remarked, the cutting back depends always on the natural character of the subject. Stout, short-jointed, moderate growing sorts, that *naturally* increase in height and diameter of stem in proper proportions, will require no cutting back. Very few, however, have this habit. In nearly all cases, more or less shortening-in, every spring, is necessary, until the stem has arrived at the requisite height, and is well proportioned, decreasing gradually in diameter from the base to the top.

The Treatment of the Soil.—During the whole period the trees remain in the nursery, the ground about them must be kept clean and finely pulverized on the surface by repeated and continual stirring. Every spring, as soon as the heavy rains are over, and the ground is settled and dry, the space between the rows should be plowed, if they are far enough apart to admit of it. A small one-horse plow, such as is used for plowing cornfields (see implements), is suitable, but it should not be allowed to go nearer than six inches to the tree, nor so deep as to come in contact with the roots. After plowing, the cultivator may be run through once each way between the rows, every week or two, and this will leave very little hoeing to be done. If the rows are so close as not to admit the plow and cultivator, the forked spade must be used in the spring, to give the ground a thorough stirring, and

afterwards the hoe. If the ground be naturally adhesive, a second or even a third plowing or spading may be necessary in the course of the summer; for it must, at all times, be kept in a loose, porous condition, or the roots will be deprived of the benefits of the air and moisture. Stirring the ground so often that weeds barely make their appearance is not only the best but most economical culture.

It need scarcely be added that, in using the plow or cultivator among trees, a very short whiffle-tree should be used, the horse should be gentle and steady, and the plowman both careful and skillful; and laborers who use the spade or hoe should be duly cautioned against cutting or bruising the trees with their implements.

SECTION 5.—PROPAGATION AND NURSERY CULTURE OF SEVERAL FRUIT-TREES AND SHRUBS NOT USUALLY GRAFTED OR BUDDED.

1st. The *Grape*.—During the last ten years, the culture of hardy grapes has made great progress in the United States. The demand for vines has, consequently, been very great, so that nurserymen and grape growers have resorted to every method of propagation that skill and ingenuity could suggest.

I think it may be truly said that a single establishment has produced as many vines in one season as all the nurseries in the Union did twenty years ago.

Grafting, layering of ripe wood and green wood, long cuttings, eyes, both of ripe wood and green wood, culture in the open air and under glass—some employing one, and some the other, and some all of these combined.

I shall proceed to describe, briefly, each of these methods.

(1.) *Layering*, which is the most simple, and the surest for unpractised hands. There are two modes of layering, one of the ripe wood, and the other of the green. The

first is performed by laying down, in the spring, a shoot or cane of *last season's* growth, bedding it in the ground, and covering it two inches or so in depth. A young plant will be produced from every eye, or joint. In the fall the cane is lifted, and the young plants separated from one another by cutting between the joints. This makes very good plants.

Layering the Green Wood is performed by laying down, in midsummer, a shoot or cane of the current season's growth in the manner described in the article on propagation, page 87, fig. 64.

(2.) *Long Cuttings*.—This is the common, well-known, old-fashioned method of propagating the hardy grapes; and is, on the whole, perhaps, the cheapest and best in all ordinary cases. It is done in this way: The strongest, roundest, and ripest shoots, or canes, of the previous season's growth, are selected, and cut into pieces twelve to eighteen inches in length; having two or three eyes, or buds, as in fig. 62.

They are cut close to an eye at the lower end, tied up in bundles of convenient size, and may be buried in sand, in a cold cellar, until the frost is out of the ground, in the spring, when they can be set in a trench in the ground, exposed to the south, in the bundles, lower end up, and covered four to six inches deep with earth. Here they can remain until the ground is dry and warm, and the weather favorable to growth. By this time the ends will be calloused, and, perhaps, even begin to emit roots, when they may be planted.

In planting, the whole cutting is buried, leaving the upper eye just at or near the surface; but the cutting is laid obliquely, as in fig. 62, so that the lower part will not be too far away from atmospheric heat.

The summer culture will consist in keeping the ground clean and mellow; and if only one shoot is allowed to grow, and kept tied up, all the better.

Propagation from Eyes.—The propagation of the hardy grape from eyes, in the open ground, or without bottom heat, is not generally practised, yet, with most kinds, it may be done with tolerable success. As in the case of the long cuttings, the rooting process should be commenced before the eyes are planted out. This is done by mixing with sand or earth or moss in shallow boxes, and placing them in a greenhouse, or in a frame with a glazed sash over them, for three or four weeks before the time of planting out. They should not be planted until the ground is warm, and the weather favorable to immediate growth. The soil should be dry, warm, and light, covering about two inches deep.

In favorable seasons, tolerably good plants are produced in this way, especially of the free-growing sorts.

The more common way of propagating from eyes is to start them on a bottom heat, either in propagating houses or in hot-beds. In houses, the bottom heat is furnished either by hot water, circulating in tanks, by hot-water pipes, or by warm-air flues of brick or tile, under the bench, in which the eyes are planted. Any and all of these modes of supplying bottom heat answer very well.

When the eyes are well rooted, they are transplanted into good, rich soil, either in another house, or in frame covered with glass, or into open borders. Larger and better ripened plants will be produced under glass, but at a much greater cost. The present system, however, of crowding them so close together in glass-houses, and forcing their growth, produces very weak, poor plants, which, but for the present demand for new sorts, would be regarded as worthless.

Propagating from Eyes of Green Wood.—This method has, of late, been resorted to for the purpose of increasing the new high-priced varieties. When a grape is selling at \$2 to \$3 per plant, the inducement to multiply it is very great. Some people think that good plants

cannot be produced in this way; but this is an error. It is true, however, that very few good plants are thus produced. If only good, strong wood were used, grown on vigorous plants, and so far advanced in ripeness as to have the eyes well developed, as good plants can be grown in this way as from ripe wood eyes. But when weak shoots or laterals are used, and when two or three crops of shoots or eyes are taken from the same plants, by a forced growth, the plants are not good. No purchaser of ordinary intelligence can be deceived with them. They are generally sold on account of their cheapness, and those who buy them on that account should not complain. My opinion is, in regard to plants, that if they are *strong, well rooted*, and *well ripened*, it is of no consequence how they were propagated.

In propagating from green-wood cuttings, the eyes are prepared in the same manner as ripe-wood eyes, but the leaf, or a portion of it, is left attached to each one, and they must have a bottom heat of 70° or 80° , or even more.

In two or three weeks they will be rooted sufficiently to bear transplanting, and then they are treated as other plants in the same condition; usually, however, they are kept under glass until the end of the season.

Grafting.—In the case of new and rare varieties, grafting has been, and is, employed with great success. We have grown Delawares fifteen or sixteen feet high, and of unusual thickness, from the graft, in one season, under glass.

Very small pieces, say two inches, if small roots, are used, as the object is merely to furnish a temporary support to the eye, until its own roots have been produced.

The root is cut to a wedge shape at the upper end, and the cion, a single eye, with about an inch of wood, is set on it like a saddle, and tied with a thread.

The planting and subsequent treatment is just the same as for eyes.

It is not my purpose to describe, in detail, all the operations connected with the propagation of the grape, but to give a general idea of the several methods, and the principles upon which they are supposed to be founded. Those who desire more explicit and full information may consult some of the special treatises on the grape, which have recently been published.

The foreign varieties of the grape are propagated almost exclusively from eyes of the ripe wood.

They are prepared and planted on a bottom heat, as described for the hardy sorts.

The eyes, however, are usually put in pots—a single eye in a 3-inch pot—when only a small number are to be propagated, or several eyes may be put in a large pot around the edges. On a large scale, the eyes may be planted directly on the propagating benches, or in boxes containing several hundred eyes.

The material used to plant them in, either in pots, boxes, or on the benches, is almost pure sand, and the eyes are inserted so that the bud shall be nearly covered.

Here, a steady temperature of 70° or 80°, and regular watering, are indispensable. When they have made a growth of three or four inches, the plants can be shifted into pots of good, rich compost, and replaced on the bottom heat, watered regularly, tied up, and the laterals suppressed; they will make fine plants in one season. Towards autumn, say after 1st of September, ample ventilation and little watering should be given, so as to promote the ripening of the wood.

Wintering the Young Plants.—Young plants of the hardy grapes, whether grown in the house or open border, should be allowed to stand in their place until the approach of hard freezing, so that they may ripen as well as possible.

They should then be taken up, “heeled in,” laid in trenches in dry soil, covering the roots and stem almost

to the top with earth, and then, over all, some leaves, straw, or evergreen branches.

Young plants of the foreign varieties, grown in pots, we usually winter in the pots, on shelves, in a cellar free from frost; but they might be wintered in the same way as the hardy grapes--shaking them out of the pots, and heeling them in.

2d. The *Currant*.—Every one knows how to propagate this. A yearling shoot, six inches to a foot long, taken off close to the old wood, and planted half or two-thirds its length in the ground, in the spring, will make a strong, well-rooted plant in the autumn. To prevent shoots from springing up below the surface of the ground, the eyes on that part are cut out, or they may be left the first season, and cut out when the plants are rooted.

The buds aid in the formation of roots. When a variety is rare and scarce, the young shoots may all be layered in July, and they will make well-rooted plants in the fall.

3d. *Gooseberries* are propagated in the same way, and with almost equal facility, as currants, though, as a general thing, they do not grow with such rapidity. Layers are the surest, but they require to be one year in the nursery rows after being separated from the mother plant, to make them strong enough for the final planting. An inch or two of swamp moss, laid over the surface of the ground in which layers are made, assists in retaining the moisture. This is applicable to all kinds of layers.

4th. *Strawberries* are propagated by the runners, which spread on the surface of the ground, in all directions, from the plant, as soon as it begins to grow in the spring. Where a variety is scarce, and it is desirable to multiply it carefully, these runners should be sunk slightly in the ground, and pegged down, as they will root and form plants for removal much quicker than if left to root in their own way. With good management, a single plant

may produce twenty-five to fifty, and even one hundred in one season. Plants to be propagated from should have abundance of space, and a deep, rich soil. An application of liquid manure will stimulate their vigor, and increase the number and strength of the runners.

The Bush Alpine varieties, which make no runners, are usually propagated by division; but it is much better to propagate them by seeds, which should be sown as soon as the fruit is ripe.

5th. *Raspberries*.—The usual mode of propagating the Raspberry is from the shoots, or canes, called “suckers,” which are produced from the collar and spreading roots of the plant. A crop of these spring up every year.

Much better plants, and many more of them, may be produced by taking up the roots, cutting them into small pieces, say an inch long, and planting them in beds of good, rich, light soil, with a little bottom heat, and a glazed sash over them, until they have made a good start. They may then be transplanted to the open borders. In this way fine plants are made in one season—much better than the ordinary suckers from old plants.

The American Black Cap family of raspberries are propagated from the tips of the shoots, which are fastened to the ground. This is their natural method of multiplying themselves.

The seeds are washed out of the ripe fruit and sowed at once, making good plants the next season.

6th. *Blackberries*.—The Blackberry is propagated in exactly the same way as the raspberry, but the cuttings of roots make much more desirable plants than the suckers. Indeed, the latter are seldom fit to be planted; being destitute of fibres, they mostly fail.

7th. *Mulberries*.—The principal Mulberries grown for the fruit are the Black Mulberry (*Morus nigra*), and Downing's Everbearing, a seedling of the *Morus multicaulis*, used so extensively in China to feed the silk-worm.

Both can be propagated from cuttings and layers, and by grafting and inarching. We usually graft on roots of the White Mulberry in the house, as we do grapes—put them in pots or boxes, and keep them under glass until they have taken well and made a few inches of growth, when they are planted out in the open ground.

8th. *Barberries*.—These are propagated from seeds, suckers, and layers in the simplest manner. It usually takes layers two years to root sufficiently to be separated from the parent plant. New or rare sorts can be grafted on the common ones quite easily.

9th. *Chestnuts* are usually grown from seed, either planted in the fall, as we always do, or kept in sand during winter, and planted in the spring. The large varieties of the Spanish Chestnut, or Marron, which do not come true from seed, can be grafted on the others.

10th. *Filberts* are grown from seed, but the finer varieties are propagated by suckers or layers, or by grafting them on seedling stocks. Plants grown in the latter way have the advantage of not producing suckers, and are, therefore, more desirable for the garden. Layering is the method usually employed in the nurseries.

11th. *Walnuts*.—Our native Walnuts, and the English Walnut, or Madeira Nut, are usually grown from seed; but there is a Dwarf prolific variety of the English, called "*Preparturiens*," which must be increased by grafting or budding on the others, and this is rarely performed with any considerable degree of success in the nurseries.

12th. *Figs*.—The Fig can be easily propagated from seeds, layers, cuttings of ripe wood or green wood, and from suckers. As the more esteemed varieties do not reproduce truly from seed, this method is seldom employed, except in seeking for new varieties. Layering is a very good way. Fruiting branches may be layered in pots or boxes, and thus fruiting plants be obtained at once.

Cuttings of ripe wood, taken off in the fall, kept in the

cellar in sand during the winter, and planted out in the spring in a warm, dry border, will grow about as certainly as grape cuttings, if not more so.

If planted in pots, and set in a hot-bed, or where they will get a slight bottom heat, they will come along more surely and rapidly. Cuttings of the green shoots, taken off when two or three inches long, and placed on a gentle bottom heat, root quickly.

SECTION 6.—LABELS FOR NURSERY TREES.

It is highly important that a correct system for preserving the names of varieties be adopted. Our practice is, to make labels of cedar, eighteen inches long, three inches



wide, and about an inch thick. These are pointed on one end, to be sunk in the ground eight or ten inches, and the face is painted white. When a variety is to be budded or grafted, the name, or a number referring to a regular record, is written on it, and it is put in the ground in front of the first tree of the variety. Besides this, we invariably record, in the nursery book, each row, with the kind or kinds worked on it, in the order they stand in the square. In case of the accidental loss of the labels, the record preserves the names. Figure 94 represents this kind of label, and though there are many others in use, we believe this to be one of the simplest and best.

Fig. 94.—
LABEL
FOR
NURSERY
ROWS.

At the time of budding or grafting, we usually write the name on with pencil, and after the square has been all worked, the numbers are made with a brush and black paint in a conspicuous manner.

SECTION 7.—TAKING UP TREES FROM THE NURSERY.

This is an operation that should be well understood, and performed with the greatest care. The importance

of the fibrous roots has been already explained. It has been shown that they are the principal absorbing parts of the roots, and when they are destroyed, the tree receives a great shock, from which it requires good treatment and a long time to recover. There is a great difference in the character of roots, some penetrating the ground to a great depth, and requiring much labor in the removal, others quite fibrous near the surface, and consequently very easily taken up. This difference is not owing alone to the difference in the species, but to whether the subjects have or have not been frequently transplanted. The way to take up a tree properly is to dig a trench on each side, at the extremities of the lateral or spreading roots, taking care that the edge, and not the face of the spade, be kept next the tree, so that the roots will not be cut off. When this trench is so deep as to be below all the lateral roots, a slight pull, and a pry on each side with the spade, will generally bring out the tree. If there be strong tap-roots, running down to a great depth, they may be cut with a stroke of the spade. Laborers who have not been accustomed to the work, invariably perform it badly; and it is difficult to get it properly done, even by experienced hands. It is a work requiring care and leisure, though it is usually performed slovenly, and in great haste.

Labelling.—When a tree, or a number of trees, of any variety are taken up, a label, with the name written on it, should at once be attached. The kind of label used in the nurseries here is a piece of pine, about three and a half inches long, three-fourths of an inch wide, and one-eighth of an inch thick.

A neck is made on one end by cutting into each edge about an eighth of an inch; a piece of No. 26 copper wire, about seven or eight inches long, is then fastened in the middle, on the neck of the label, with

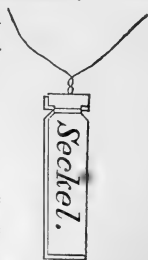


Fig. 95.—WIRED LABEL FOR TREES.

two or three twists. The two ends of the wire are then placed around the stem, or a branch of the tree, and are fastened with a twist or two. This kind of wire and label we find, by experience, to be not only safe, but more expeditiously attached than any other. If a little paint is rubbed on just before being used, the writing will be more legible and permanent, but it should be so light as to be barely perceptible, else it will clog the pencil. These labels are now manufactured in this city by machinery, and furnished to the nurserymen, without the wire, at thirty to forty cents per thousand. The wire costs sixty cents per pound, and is cut into lengths with a pair of common shears.

Packing.—Persons who are ignorant of the structure of trees never appreciate the importance of packing, and that is the reason why so many trees are every year destroyed by exposure. It is not uncommon, in this part of the country, to see apple trees loaded up on hay-racks, like so much brush, without a particle of covering on any part of them, to travel a journey of three or four weeks in this condition. Of course it is utterly impossible that such trees can live or thrive; and yet the persons who thus conduct their nursery operations are doing the most profitable business. Such practices are not only dishonest, but highly injurious and disreputable to the trade; and it is by no means fair to class such people amongst respectable and honorable nurserymen.

Purchasers are often at fault in this matter. Nurserymen have to buy and pay for the material used in packing. Mats cost one to two shillings apiece; straw, four to five cents per small bundle; yarn, one to two shillings per pound; moss, \$15 to \$20 per cord; and besides, the labor of packing, when *well done*, is very great. It is, therefore, not unreasonable that a charge be made; but some people, rather than pay fifty cents for packing fifty trees, would expose themselves to the risk of losing all.

Purchasers should invariably charge the nurseryman, to whom they send their orders, to *pack in the best manner*. Better pay one or even two cents per tree for packing than lose it, or injure it so much as to make it almost worthless.

The mode of packing pursued here is this: Where the trees are packed in bundles, a number of ties are first laid down, then a layer of long rye straw, three or four inches deep; the trees are then laid compactly together, straw being placed among the tops, to prevent their being chafed when drawn together, and damp moss from the swamp is shaken among the roots. When the bundle is built, long straw is placed on the top as below, and it is then bound up as tightly as it can be drawn. Straw is then placed around the roots sufficiently thick to exclude the air, and then a bass mat is sewed on over the straw. If the bundle is only to go a short distance, the straw can be so secured around the roots that the mats may be dispensed with; but if it has a long journey to perform, it should be matted from bottom to top, and sewed with strong, tarred, spun yarn, about as thick as a goose-quill. *Boxes* are more secure for very long journeys; they are generally made of $\frac{5}{8}$ -inch white pine timber. Boxes are now employed almost exclusively, as they are found to be cheaper and safer, and railroads charge one-half more freight on strawed or matted bundles. If the trees are composed of several varieties, they should be tied in small parcels of four to six each, according to the size. The sides and ends of the box should be well lined with straw, and the roots bedded in moss and the tops in straw, to prevent chafing.

If the box be large, two rows of cleats are necessary—one in the middle, and one in the top, to hold the trees in their place, and to keep the box from spreading. When the box is nailed up, it should be banded both at the ends and middle with iron hoops, fastened with wrought nails.

Hickory hoops are sometimes employed, and answer very well. Packed in this way, trees may go any distance with safety. The season of the year modifies the mode of packing. The roots should always, for a long journey, be immersed in a thin mud before being packed, as this excludes the air; but in the fall, this mud should be dry before the package is made up, and the moss should contain very little moisture. In a frosty time, the less moisture there is about the roots the better; but an abundance of straw should be used to exclude the air and frost.

Heeling-in.—When trees are taken up, and can neither be packed nor planted at once, they are laid in by the roots in trenches; the longer they have to remain in this situation the better it should be performed. Trees are often wintered in this way, and, if the trenches are dug deep, and the roots well spread out, and deeply covered, they are perfectly safe. It should be done, in such cases, with almost as much care as the final planting of a tree. When great bundles of the roots are huddled in together, and only three or four inches of earth thrown over them, both air and frost act upon them, and they sustain serious injury. Tender trees, likely to suffer from the freezing of the shoots, should be laid in an inclined, almost horizontal, position, and be covered with brush, evergreen boughs, or something that will break the violence of the wind and frost. Straw should not be used, as it attracts vermin. Some rough litter or manure should also be thrown around the roots, and in this way the most tender of all our fruit trees may be wintered with safety.

PART III.



THE LAYING OUT, ARRANGEMENT, AND GENERAL
MANAGEMENT OF DIFFERENT KINDS OF PER-
MANENT PLANTATIONS OF FRUIT-TREES,
SELECTION OF TREES AND VARIETIES,
AND PRUNING AND CONDUCTING
TREES UNDER VARIOUS FORMS.



CHAPTER I.

PERMANENT PLANTATIONS OF FRUIT-TREES.

SECTION 1.—THE DIFFERENT KINDS OF PLANTATIONS.

The different kinds of plantations may be classed as follows: 1st. The *Family Orchard*, which is a portion of the farm set apart for the production of the more hardy and common fruit, principally apples, for the use of the farm stock and the family. 2d. The Market, or Commercial Orchard, a large plantation of the various species of fruit-trees, for the production of fruit as an article of commerce. 3d. The *Fruit Garden*, which, with the farmer, is a plot of ground near the dwelling, in which the finer fruits, as pears, peaches, plums, cherries, apricots, etc., and all the small fruits, are cultivated. In many cases, and even in most cases, it is a portion of the kitchen garden, where the table or culinary vegetables are grown. With the professional man, the merchant, the mechanic, and others who reside in cities, villages, and their suburbs, possessing but small tracts of land, at most but a few acres, the fruit garden is the only source for the supply of fruits for their families, and is usually planted with the most rare, perishable, and valuable sorts, that cannot so easily be procured in market.

The pleasure and profit derived from fruit plantations, under any or all of these circumstances, depend upon *the judicious selection of soil, situation, trees, and varieties, and their proper arrangement and management.* These are the essential points, and every man who contemplates planting to a greater or less extent, should avail himself of all the light which experience has shed

upon these various branches of the subject, before making the first movement towards the execution of his project.

SECTION 2.—THE ORCHARD.

The orchard is distinguished from the fruit garden in this, that the trees planted in it are generally of the largest size to which the species attain; they are grown in the natural, or, as it is called, standard form, without any particular training, and the varieties are generally the most hardy and productive of the species.

1st. *The situation of an orchard*, with regard to exposure or aspect, requires very little consideration in some parts of the country. Where, as in Western New York, for instance, the winters are uniform, or comparatively so, in temperature, and late spring frosts do not prevail, the main difficulties to guard against are the prevailing high winds from the west and north that injure the blossoms, and blow off the fruit before it is mature. If possible, a situation should be chosen where some natural obstacle, as a hill, or a belt of woods, would break the force and influence of these destructive winds. Where no such obstacle naturally exists, a belt or border of rapidly-growing trees, such as *Soft Maple*, *White Pine*, *Norway Spruce*, *Scotch Pine*, *European Larch*, etc., should be planted simultaneously with the planting of the orchard, that they may grow up and form a protection by the time the trees have come into bearing. Instances occur every year in our own section where sheltered orchards bear full crops, whilst those fully exposed to the winds fail entirely.

In other sections, as in some of the central and southern counties of New York, and in some parts of Ohio, Illinois, Wisconsin, and others of the Western as well as in the Southern States, where late and fatal spring frosts prevail, the selection of a situation is a most important

point. In such localities, an eastern and southern exposure, and low grounds, are to be avoided.

John J. Thomas, in his *Fruit Culturist*, states that, "In the valley of the Coshocton, which is flanked by hills five hundred feet high, peach-trees have been completely killed to the ground, but on one of the neighboring hills, five hundred feet above, and probably twelve hundred feet above the level of the sea, an orchard, planted in good soil, yields regular crops. In the town of Spencer, Tioga County, near the head of Cayuga Inlet, peaches have withstood the climate and done well at an elevation of seven hundred feet above Cayuga Lake." Lawrence Young, Esq., Chairman of the Kentucky Fruit Committee, reported to the Pomological Convention at Cincinnati, in 1850, the case of an orchard in that State, lying within the peach district, occupying the slopes of hills of no great height, inclining gently toward a river, distant only a few hundred yards. Its success was that common to a fickle, western climate—a fruit year and a failure, or perhaps two years of productiveness and three of disappointment in every five.

Within five miles of this orchard, however, is located a hill six hundred feet high, upon which the peach crop has not failed since he first knew it. Numerous other instances are quoted and the particulars given with great accuracy, showing the effects of even very slight elevations.

Among others, is an instance of the Heath Peach bearing a full crop in one part of an orchard, whilst in another part, thirty feet lower, the same variety bore not a single fruit. Multitudes of such cases might be collected in all parts of the country where the climate is variable, because in such situations vegetation is earlier excited than in those more elevated and colder, and frosts always fall more heavily on low than on high grounds. Every one who has paid the slightest attention to the action of frost on

vegetation is aware, that even an elevation of two or three feet of one portion of the same field or garden above the other frequently proves a protection from an untimely frost. In a dry and firm soil, vegetation is more exempt from injuries by frost than in a damp, soft, and spongy soil on the same level, not only because trees on such soils are more mature and hardier in these parts, but because the soil and the atmosphere above it are less charged with watery particles that form the deposition of frost. Bodies of water that do not freeze in winter, such as some of our inland lakes, exert a favorable influence for a considerable distance from their margins in protecting vegetation from late spring and early autumn frosts. This is well illustrated in Western New York, along the south shore of Lake Ontario. Here, in the counties of Wayne, Monroe, Orleans, and Niagara, for a distance varying from five to seven miles from the lake, the peach crop rarely fails; while farther inland, as the lake influence diminishes, the peach crop, for the last ten years, has been, with occasional exceptions, a failure.

In some parts of the West, as in Wisconsin and Illinois, the winters are so variable—during the day as mild as spring, and in the night the mercury falling many degrees below zero—that even the apple and pear trees in soft, damp, and rich soils are frequently killed to the ground.

In such localities, experience has taught cultivators that elevated, dry, firm, and moderately rich soil, that will produce a firm, well-matured growth, is the only safeguard against the destruction of plantations in the winter.

In all localities where fruit culture has made any considerable progress, there is generally experience enough to be found, if carefully sought for and collected, to guide beginners in fixing upon sites for orchards; and no man should venture to plant without giving due attention to the subject, and availing himself of all the experience of his neighbors; for experience, after all, is the only truly reliable guide.

2d. *The Soil*.—Having treated already of the different characters and modes of amelioration of soils, it is only necessary here to point out what particular qualities or kinds are best adapted to the different classes of fruit-trees, as far as experience will warrant in so doing. There are soils of a certain texture and quality, in which, by proper management, all our hardy fruits may be grown to perfection; for instance, the soil of our specimen orchard, which is that usually termed a *sandy loam*, with a *sandy, clay subsoil*, so dry that it can be worked immediately after a rain of twenty-four hours. On this we have apples, pears, plums, cherries, peaches, apricots, and, indeed, all the fruits planted promiscuously, side by side, not of choice, but necessity, and all these yield bountiful crops of the finest fruit. Our country abounds in such soils, and others somewhat different in character, but equally eligible for all fruit-trees when well managed. On the other hand, there are soils wholly unfit for fruit-trees of any kind—such are peaty or mucky, and damp, cold, and spongy soils. For an orchard of apples or pears, a dry, deep, substantial soil, between sandy and a clayey loam, and possessing among its inorganic parts a considerable portion of lime, is, according to all experience, the best. On such soils we find the greatest and most enduring vigor and fertility, the healthiest and hardiest trees, and the fairest and best-flavored fruits. Trees, both of apples and pears, planted on such soils in Western New York, upwards of fifty years ago, are, at this day, in the very hight of their vigor and productiveness, without having received more than the most ordinary culture. It has been observed that apples, grown on clayey soils, keep better than those grown on light soils.

The *plum* succeeds best, as a general thing, on a clayey loam, rather stiff. The Canada or native plum, and Mirabelle, however, succeed well on very light soils. The

cherry, the *peach*, *apricot*, *nectarine*, and *almond*, require a light, dry, and warm soil. The best and most enduring peach orchards are on dry, sandy loams; but good orchards are raised, with proper management, on loose, light sands, though on such the trees are shorter lived, and require constant care in the way of dressings of manure and compost. There are two points to be observed under all circumstances in regard to soils. They must possess the inorganic substances, such as lime, pot-ash, etc., that constitute a large portion of the ashes of the wood and bark of fruit-trees, when burned, and a sufficient amount of organic matter—vegetable mould, which dissolves, and furnishes material for the formation and growth of new parts. People who have been long engaged in the culture of the soil can judge pretty correctly of its quality by its appearance, texture, subsoil, and the character of the rocks and stones that underlie and prevail in it.

3d. *Preparation of Soil for an Orchard*.—The season before planting, the soil should be at least *twice plowed* with a common and subsoil plow, enriched with suitable composts, and drained, if necessary.

4th. *Inclosures*.—Before a tree is planted, it is necessary that the ground be inclosed with a fence, sufficient to protect it against the invasion of animals. It is no uncommon thing to hear people regret that the cattle broke into the orchard and destroyed many trees. Indeed, it frequently happens that more damage is done in this way than, if duly estimated, would have fenced the whole orchard. There is much inquiry nowadays on the subject of fences, and various plans and materials are suggested and tried. *Live hedges* are unquestionably the most ornamental and appropriate inclosures for extensive plantations of fruit-trees, and in time will, no doubt, be generally adopted. Hitherto the failure of many plants tried, and the cost and difficulty of obtaining others, have

retarded their introduction. Experience, however, has at length pretty fairly decided that the *Osage Orange* is the best for the West and South-west, and the *Buckthorn* for the North and East. The seeds of both these plants are now easily procured, and plants of them may be obtained in nurseries from \$3 to \$5 per 1,000; and about 2,000 will fence an acre of ground, setting the plants twelve inches apart, in two rows, six inches apart, which is the strongest way. A single row, with the plants at six inches apart, will make a good fence, with proper shearing to thicken them at the bottom; either way they will make a beautiful and efficient hedge in five or six years. The *Honey-Locust* is also a strong, hardy, rapid-growing plant, and makes a very beautiful and efficient hedge, which, in six or seven years from the planting, will turn any animals. We are using this on our own grounds in preference to all others.

For an *ornamental* hedge, and screen or shelter, there is nothing equal at the North to the *Norway Spruce* and *Arbor Vitæ*. It is sometimes objected to hedges that they harbor birds; but it is to be remembered that birds are the natural foes of insects, and never fail to accomplish a vast amount of labor for the good of the fruit grower, for which they ought to be fully entitled to a participation in his enjoyments. As the feathered race are persecuted and driven away from our gardens, insects become more numerous and destructive; at least this is the experience of most people, and should lessen, if not entirely prevent, the cruel hostility that is continually waged against them. It must, however, be admitted that occasionally certain species will attack our fruits in such force that their destruction becomes not only justifiable, but necessary. Even the *Robin* becomes troublesome at times.

5th. *Selection of Varieties of Fruits for an Orchard.*—This is a most important point. The selection of varie-

ties must, in all cases, be made with reference to the special purposes for which they are intended. The family orchard of the farmer we will suppose to contain apple-trees alone, as all the other fruits are, or ought to be, grown in the *fruit garden*. His selection of varieties must be adapted to his wants and circumstances. In the first place, the number of his family must regulate the proportion of kitchen and table varieties. In the second place, he must consider how many he will want for *sauce*, how many for *baking* and *drying*, how many for *cider*, and how many for the *dessert*, and what proportion of *sweet* and of *acid*. These are all considerations that depend upon the habits, taste, and mode of living of families, and for which no man can provide or suggest but the planter himself. Then, again, he must consider to what extent it may be advantageous to feed apples to his stock, and provide for it accordingly.

Without considering well all these points, a man may sit down and select what are called "the best varieties," and yet find himself badly suited when they come to bear; for so it happens that a variety that may be *best* for the dessert, will be exceedingly unprofitable for other purposes. A hardy, vigorous, and productive variety, of medium quality, quite unfit for the table, may be infinitely more advantageous for feeding stock than a feeble-growing, shy-bearing variety, quite indispensable for the dessert; and an apple may be excellent for sauce, for baking, or drying, and unfit for the dessert. These points should all be duly considered.

The *Market* or *Commercial Orchardist* must exercise the same discrimination in the selection of his varieties, adapting them to the mode of culture he intends to pursue and the market he intends to supply. In the immediate vicinity of large cities and towns, where the orchardist may carry his fruit to market in a few hours, the most profitable culture will, generally speaking, be

summer and early autumn fruits, or such as require to be consumed immediately after maturity, and are unfit for distant transportation. *Early* apples and pears only will be profitable for him, because the autumn and winter varieties can be sent so easily from the most distant portions of the interior, with such facilities as our present system of railroads, plank-roads, canals, and steamboats afford. In addition to early apples and pears, his position gives him great advantages for the profitable culture of all the *stone fruits, gooseberries, currants, raspberries, grapes,* and such soft fruits, when intended to be disposed of in a raw state.

The market grower of the interior will find his most profitable culture to be principally *autumn and winter apples and pears*, to which he may add *quinces*, and, if the climate and soil be favorable, the *grape*, because all these can be packed and transported to a great distance with safety; and the comparative cheapness of his lands enables him to compete advantageously with those more favorably situated in regard to market. He can only cultivate the summer fruits with a view to drying or preserving, or for the supply of a local demand. All orchard fruits, intended for profitable orchard culture, should be, *first*, in regard to the trees, *hardy, vigorous, and productive*. The fruits should be of *good size, fair appearance, good keepers*, and of *good quality*. It should be borne in mind that many of the best fruits are very unprofitable for *general* market culture. Under certain circumstances this may not be the case, as, for example, in the neighborhood of such a city as *London*, or *Paris*, or even *New York*, or *Boston*. A class of people is to be found in such places who will pay almost any price for *extra fine* fruits. Where apples can be sold for \$2 per bushel, pears at \$1 per dozen, grapes at \$1 per pound, and other fine fruits in proportion, growers are warranted in cultivating very choice sorts, even if they be difficult to manage and

comparatively unproductive. As a general thing, however, taking the markets as they are, the great bulk of consumers preferring fruit of tolerable good quality and moderate prices to the very best at twice or three times the ordinary price, the most profitable varieties will be those that can be produced at the least expense, provided, always, that they be *good*; for fruits of a decidedly inferior quality, whatever may be their other merits, are wholly unworthy of cultivation for the market. Another thing is the selection of varieties that succeed best in the locality where they are to be cultivated. A variety that succeeds remarkably well in any particular locality should, other things being nearly equal, be cultivated largely. The *Newtown Pippin* apple, for instance, is a profitable orchard fruit on Long Island and on the Hudson; but in Western New York no system of management would make it yield one-fourth as much net profit as the *Baldwin*, *Northern Spy*, *Rhode Island Greening*, or *Roxbury Russet*. Large plantations, for profit, should always be made up of well-proved varieties, that have been tested in the locality, or one similar, in regard to soil and situation. A list of select varieties will be given in a succeeding and separate part of the work.

6th. *Selection of Trees*.—For the farmer's orchard, where the ground among the trees is to be cultivated mainly with the plow, and occasionally cropped, standard trees, with stems four or five feet in height, will be the most eligible, and ought to be, at the time of planting, three or four years old from the bud or graft, well grown, with stout, straight, well-proportioned trunks. Low, stout trees are always preferable to tall, slender ones. Inexperienced planters are generally more particular about the height than the diameter of the trunk, but it should be just the reverse. If trees are stout, and have good roots, a foot in height is comparatively unimportant, unless to one who wishes to turn cattle into his orchard, and

have the heads of his trees at once out of their way. Few people, however, follow such a practice. In very elevated and exposed situations, low trees are to be preferred, as the wind does not strike them with such force as it does the tall ones.

7th. *Arrangement of the Trees.*—The distance between the trees in an apple orchard should be thirty feet from tree to tree, in all directions. In a very strong and deep soil, where the trees attain the largest size, *forty* feet is not too much, especially after the first fifteen or twenty years. There is a great difference between the sizes that different varieties attain, and also in their habits of growth. One will attain nearly double the size of another within ten years. Some are erect in their habits (as fig. 3), others spreading (as fig. 5); and it will add greatly to the symmetry of the plantation if the trees of the same size and habit of growth be planted together. Varieties that ripen about the same time should also be planted together, as the maturity can be more easily watched, and the fruit gathered with much less inconvenience. The largest fruits, being most liable to be blown off, should be placed in the least exposed quarter.

The ordinary arrangement of orchard trees is the square or regular form, in rows, the same distance apart, and an equal distance between each tree. Thus, in planting a square of one hundred feet, for example, the trees to be twenty-five feet apart, we commence on one side, laying a line the whole length. On this line we measure off the distances for the trees, and place a stake, indicating the point for the tree. Thus, in fig. 96, we have five rows of five trees each, making twenty-five in all, and all twenty-five feet apart. This is the simplest, and probably the best for very small orchards. The better plan for large orchards is what is called *quincunx* (fig. 97), in which the trees of one row are opposite the spaces in the next. In this way, although the trees are at equal dis-

tances, there is a larger clear area around each tree. In fig. 96, the square form, every tree stands in the corner of a square, in the centre of, and equally distant from, *four* others. In the quincunx, every tree stands in the angle of a triangle of equal sides, and in the centre of, and equally distant from, *six* others. Thus, in the latter,

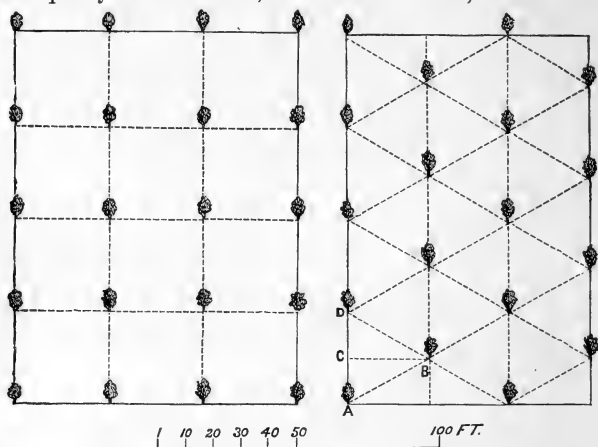


Fig. 96.—SQUARE PLANTING. Fig. 97.—QUINCUNX PLANTING.

there is a greater space left for the admission of light and air, and trees so planted may be at less distance than in the other. The operation of planting is more complicated than that of the square, the rows not being the same distance apart as the trees are in the row. The first thing to be done is to find the two measures. Suppose, for instance, we propose to plant a plot of ground one hundred feet square, and to have the trees twenty-five feet apart every way, we make a triangle of wood, *A, B, D* (fig. 97), each side of which is twenty-five feet; we then measure the distance from the angle, *B*, to the center of the opposite side, at *C*, and this gives us the distance between the rows, which will be about twenty-one feet. This will be called the *small* measure; and

with this we measure off on two sides the distances for the rows, and put down a stake at each. We then commence on the first row, and with the long (twenty-five feet) measure mark off the places for the trees, and put down a stake to each. The measurements must be made with exactness, in order to have the plantation present a regular appearance, as in fig. 97.

8th. *Selection of Trees for the Market or Commercial Orchard.*—The remarks made in reference to the selection of standard trees for the family orchard may be applied with equal propriety to these; but the orchardist must be supposed to have invested a considerable amount of capital, and probably devotes his entire attention to his trees, and depends upon them for his support. It is, therefore, a great object with him to have early returns in the form of products. An orchard of standard apples will not produce any considerable quantity of fruit before the eighth or tenth year, nor pears before the twelfth or fifteenth year. In the mean time it is highly desirable to occupy the ground amongst the trees in some way that will at least bear the expenses of cultivation. If this can be done, it is as much as can be expected in the usual practice of cultivating root crops. The most profitable manner of turning to account the spaces between the standard trees for the first ten or twelve years at least, is to plant them with dwarf and pyramidal trees, or dwarf standards, that will commence bearing the third or fourth year after planting. This is the course pursued by the orchardists of France and Belgium, where land is valuable, and the cultivators are compelled to turn every inch of it to the best account. Attention has been slightly called to this mode of management in this country, and a few persons have already carried it into practice. As soon as it comes to be considered, it cannot fail to recommend itself to those who are embarking extensively in the orchard culture of fruits for the market,

on high-priced lands. It is only surprising that it should have been so long overlooked by shrewd and enterprising orchardists. An acre of land, for example, planted with standard apple-trees, at thirty feet apart, contains forty-five to fifty; and if we fill up the spaces with *dwarfs* on Paradise, at six feet apart, leaving ten feet clear around each standard, we get in about five hundred dwarf trees. These will bear the third year, and during the next five years the average value of their products will be at least twenty to fifty cents each. We would plant them in such a way that the plow and cultivator could be

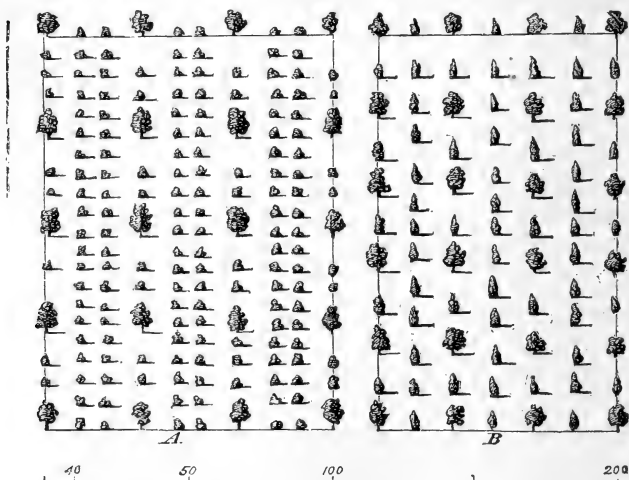


Fig. 98.

Fig. 99.

Fig. 98, orchard of standard and dwarf apple trees. Fig. 99, orchard of standard and dwarf or pyramidal pears.

used among them, two dwarfs between each standard, and two full rows between each row of standards, as in fig. 98.

In ten or twelve years, the dwarfs might be taken out, and the entire ground given to the standards.

Orchards of standard pears may, in the same manner, be filled up with dwarf and pyramidal trees on the quince.

Standard pears do not require so much space as apples; their branches generally are more erect. In this country standard pears should not have naked trunks over three or four feet high, and twenty-five feet apart are quite sufficient; at this distance an acre will contain about seventy trees. These, as a general thing, will not begin to bear until the tenth year, unless artificial means be resorted to. Some early-bearing sorts, like the Bartlett, may commence bearing much sooner; but, as a general thing, the crop from standard pears is not of much account until the trees have attained ten years of age, or thereabouts. By putting one dwarf standard between each, in the same row, and a row ten feet apart between each row of standards, as in fig. 99, we can plant 250 dwarfs or pyramids, that will commence bearing the third year, and will be in full bearing the fifth, yielding not less, on an average, than \$1 to \$2 per tree.

In selecting varieties of pears for profitable orchard culture on the quince, those only should be chosen which have been well proved *on that stock*, and also in the locality, or a similar one, and that are popular in market. Mr. Quinn, in his book "Pear Culture for Profit," states that the Duchesse d'Angoulême is almost the only one really profitable in his soil, in New Jersey.

The following sorts succeed well on the quince, and are profitably grown here: *Louise Bonne de Jersey*, *Duchesse d'Angoulême*, *Beurre d'Anjou*, *Howell*, *Josephine de Malines*, *Vicar of Winkfield*, to which I might add many others.

Peach trees should be only one year old from the bud, and set at a distance of about fifteen feet. At this distance the trees soon grow to afford each other considerable shelter. Mr. W. C. Flagg, of Alton, Ill., an orchardist of experience, writes in *Tilton's Magazine*, November, 1869, that he plants his large peach orchards in squares of 100 trees, at sixteen and a half feet apart each

way. Each square is composed wholly of one sort, for convenience in gathering the fruit. Each square is separated from the next by a *double* space, or two rods. Mr. Flagg objects to mixed orchards, as of apples and peaches, on account of certain difficulties of cultivation. There may be some force in his objection in his locality, but, according to my experience, there is none at the East. Where land is cheap, there is nothing gained by mixing. Where land is worth from \$200 to \$500 per acre, the case is quite different.

Standard cherries, on Mazzard stocks, should not be over two years old from the bud, with stems three or four feet high. In the West and South, where the trees are subject to the bursting of the bark on the trunk, it is advisable to have the trees branched as near the ground as possible; and in such cases the *Mahaleb stock* is better than the Mazzard, as it makes lower, more compact, and fertile trees. Orchards of pyramids, or low dwarfs, on the Mahaleb, may be planted at twelve feet apart, or the ground may be more compactly filled by planting standards and dwarfs alternately, as in the case of the pears. Cherries, on the Mahaleb, I would prefer to be only one year from the bud, and, indeed, this is my choice on any stock.

Apricots, on peach stocks, may be planted in the same soil, and should be of the same age and character as the peaches. On plum stocks they are better adapted to heavy soils.

Plum-trees, for orchard standards, should be about two years old from the bud or graft, with stems about three feet high. The stone fruits, in particular, should have low stems, as they are more subject to the gum on the trunk if pruned up high. They may be planted at fifteen feet apart, the same as peaches and apricots. *Quinces* should be two years old, at least, and may be three from the layer, cutting, or bud; they may be planted twelve feet apart, which gives about 300 to the acre.

9th. *Pruning and Preparing the Trees for Planting.*—

When a tree is taken up from the nursery, it unavoidably loses some of its roots, and others are more or less mutilated; the roots frequently suffer by long carriage or exposure, and in this state it is unable to support the entire head as it came from the nursery. This has been previously explained. In order that a tree may grow, it is necessary that a balance should exist between the stem or branches, and the root; consequently, when a tree is transplanted, its branches should be reduced by shortening so as to correspond with the roots. A standard tree, that has four or five branches forming a head, should be pruned, at the time of planting, to within three or four buds of the base of each of the branches. These remaining buds, receiving all the nourishment, will push vigorously, whilst, if the branches had been allowed to remain entire, they would have required a greater supply of food than the roots could have furnished, and the tree would either have died or made a very feeble growth. Every bud we leave on the top of a tree will produce either leaves or shoots, and these are so many new individuals requiring sustenance. If we leave one hundred, it is plain the demand will be much greater than if we leave only twenty. The roots must be dressed by cutting back all bruised points to the sound wood, with a smooth cut on the under side of the root. Trees thus prepared are ready for planting.

10th. *Planting Orchards.*—When the soil has been thoroughly prepared by subsoil plowing, or trenching the season previous, the planting is a simple matter; but if this has not been done, planting properly requires considerable labor; for large holes, three or four feet wide, and one and a half to two feet deep, must be dug for the trees, and the requisite composts procured to be mixed with the earth in which the roots are to be placed. The planting offers an excellent opportunity for supplying any defects in the soil;

for instance, if too compact, sand, leaf mould, muck, etc., may be added, to render it more porous; and if too light, clay, stiff loam, ashes, etc., may be added, to make it more retentive. The proper way to furnish these materials is to dig large holes, and put a good bed, twelve to eighteen inches deep, of the compost in the bottom under the trees. Lime should form a part of all composts, and especially for the apple and pear; half a peck may be mixed with the bed of each tree in soil not naturally calcareous. In digging the holes, the good surface soil should be laid on one side, so that it can be used to fill in among the roots, and for this purpose it should be as finely pulverized as possible. In a soil adapted to fruit culture, if in a good state of fertility, there is no necessity for either large holes or compost. Our mode of planting is simply to prepare the land by a thorough plowing, and then dig the holes just deep and wide enough to admit the roots, using neither manure nor compost.

When the compost has been laid in the bottom of the hole, and a layer of fine surface soil spread over it, so as to be highest in the center, the tree is set on it, so that when the planting is finished, the collar will be about two inches below the surface. In the case of trees on dwarf stocks, such as pears on quince, *all the stock* must be under the ground. The roots must be carefully adjusted, so that each one is spread out in its natural position; the fine earth is then filled in amongst them, so that no vacancies will be left; the upper roots should be held back by the person who holds the tree until the lower ones are covered. When the filling-in is half done, it may be gently trodden down with the foot, so as to give the tree a firmer hold of the ground; and when the filling-in of earth on the roots is finished, tread down firmly. In advanced spring planting, a pail of water might be given to each tree when the earth is partly filled in; at other times it is unnecessary, if not injurious.

11th. *Staking*.—Where the trees are large, or the situation is exposed, either one or two stakes should be planted with each tree, to which it must be kept fastened for the first season, until the roots have fixed themselves in the ground. A proper provision must be made to prevent the tree from rubbing or chafing against the stake. When two stakes are used, it may be fastened to each in such a way as not to rub against either.

12th. *Mulching*.—This should be looked upon as an indispensable operation in all cases. It consists in laying on the surface of the ground, around the trees, to the distance of three feet or so, a covering two or three inches deep of half-decomposed manure, short straw, hay, etc., or litter of any kind, that may be at hand. This prevents the moisture of the soil from evaporating, and maintains a uniformity of heat and moisture which is highly favorable to the formation of new roots. It also prevents the growth of weeds around the tree, and obviates the necessity of hoeing, dressing, or watering, during the season. We frequently practise it among nursery rows of late, spring-planted trees with great advantage. A deep mulching should always be given to fall-planted trees, to prevent the frost from penetrating to the roots or drawing up the tree.

13th. *After-management of Orchard Trees*.—This consists in the cultivation of the soil among the trees, and pruning them to regulate their growth. For the first five or six years after planting, the ground among orchard trees may be advantageously cropped with potatoes, rutabagas, or sugar beets. The manuring and culture that these roots require keep the soil in good condition, and will assist in defraying the expenses of the orchard. Grain crops should never be planted among trees, as they deprive them of air to a very injurious extent. If no root crops are cultivated, the ground should be kept clean and mellow with the one-horse plow and cultivator, the

same as recommended for nursery culture. Every third or fourth year, or when their growth indicates the need of it, the trees should receive a dressing of well-decomposed manure or compost, spread on the surface of the ground, over the roots, or partially worked in with a fork. This should always be done in the fall. Dwarf apples and pears require more frequent and liberal manuring than standards, because their roots occupy a limited space; their heads are large compared with the roots, and they bear exhausting crops. Whoever has a large plantation of these trees should be well provided with heaps of compost, a year old, and give each tree a peck to half a bushel every year before the setting in of winter. This will maintain their vigor, and insure large and regular crops of fine fruit. Directions for pruning and forming the heads of standard trees will be treated of under the general head of pruning. A good way of renewing the soil where manure cannot be had is to sow peas, and when they are grown just to blossom, plow them under.

There are those who advocate seeding orchards with some of the finer grasses, such as are used for lawns, and keeping it cut short. The advantage claimed is, that it protects the roots from excessive heat in the summer. I think this may answer tolerably well for the apple, but for all others, and even for that, I should prefer a mulching of straw, hay, or some sort of litter, during the greatest heat of summer. At the North we do not even need this.

In some parts of the West and South, where the pear suffers from leaf blight, mulching during the warm season is a necessity, and will, I am sure, prove far more beneficial than *grass*, no matter how short it may be kept.

SECTION 3.—THE FRUIT GARDEN.

The fruit garden is a plantation of fruit-trees, intended to supply the family with fruit. In some cases, where a large supply of fruit is wanted, and the proprietor has land and means to warrant it, a certain portion of ground is wholly devoted to it; and in others it forms a separate compartment of the kitchen garden, or is mixed with it—the fruit-trees occupying the borders, or outsides of the compartments, and the culinary vegetables the interior. The latter is most general, in this country, at the present time. In a country like ours, so well adapted to fruit culture, where almost every citizen not only occupies but owns a garden, and, as a general thing, possesses sufficient means to enable him to devote it to the culture of the higher and better class of garden productions, the fruit garden is destined to be, if it is not already, an object of great importance. In the old countries of Europe, the rich alone, or those comparatively so, are permitted to enjoy such luxury; for land is so dear that working people are unable to purchase it, and if they are, they are either unable to stock it with trees, or their necessities compel them to devote it to the production of the coarsest articles of vegetable food that can be produced in the greatest bulk. It is not so in America. Here every industrious man, at the age of five-and-twenty, whatever may be his pursuits, may, if he choose, be the proprietor of a garden of some extent, and possess sufficient means to stock it with the finest fruits of the land.

The present actual state of the population gives abundant evidence of this happy and prosperous condition. Let us look at our cities and villages. In Rochester, excepting a narrow circle in its very center, every house has its garden, varying in extent from twenty-five by one hundred feet to an acre of ground, and not one of these but is nearly filled with fruit-trees; and so it is, but on a

larger scale, in all the villages of Western New York—a section of country in which the first white man's settlement can scarcely date back over sixty years. Aside from the beneficial results to individual and public health and prosperity from this general union of the fruit garden and the dwelling, it cannot fail to exercise a softening and refining influence on the tastes, habits, and manners of the people, and greatly strengthen their love of home and country.

The great thing wanting at this moment is a knowledge of the correct method of planting and managing fruit gardens. We cannot pass along the streets a rod, where there is a garden, without seeing and feeling that three-fourths of the profit and pleasure which gardens might afford, are sacrificed to bad management, arising, in the main, from ignorance of the proper modes of culture adapted to such limited grounds; and it is hoped that the suggestions and plans offered in the following detail of fruit-garden management may afford at least a portion of the information wanted.

The formation of a fruit garden requires a consideration of the *soil, situation, inclosures, laying out, selection of trees, selection of varieties, and planting.*

1st. *The Situation.*—This is generally governed by the particular circumstances of the proprietor, those only who build with reference to the location of the garden, or who have a large domain at their disposal, having an opportunity of selection to any considerable extent. Persons who live in cities and villages have to make the best of their situation. As it is, if it be exposed, they can only give it protection by lofty inclosures, that will break the force of the winds. The *aspect* they cannot alter, and must adapt other circumstances to it. Those who can should select a situation convenient enough to the dwelling to render it at all times easy of access, in order to save time and labor in going to and from it. It

should also be sheltered from the north and west winds. The former are destructive to the blossoms in spring, and the latter frequently blow off the fruit before its maturity. In sections of the country subject to late spring frosts, an elevated situation is to be preferred, as in the case of orchards. A full eastern or southern aspect should be avoided, because in both the sun's rays strike the trees while the frost is upon them, and produce injuries that would be avoided in other aspects. Where artificial shelter is required, a belt of rapid-growing trees, composed of evergreens and deciduous trees mixed, should be planted on the exposed side, but at such a distance as to obviate any difficulty that might arise from the injurious effects of shade, or from the roots entering the garden. Such a belt of trees might, at the same time, be made to impart a pleasing and highly ornamental appearance to the grounds.

2d. The *Soil* is a most important consideration. As in a garden a general collection of all the fruits is to be grown, and that in the highest state of perfection, the soil should be of that character in its texture, depth, and quality, best adapted to general purposes. It should not only be suitable for the apple and the pear, but for the peach, the cherry, and the plum—a good, deep, friable loam, with a gravelly clay subsoil, and entirely free from stagnant moisture. In this country, our warm summers and frequent, protracted drouths render a deep soil for a garden absolutely necessary. The means for deepening, drying, improving, and changing the character of soils have been already pointed out under the general head of Soils, and need not be repeated here. Suffice it to say, that it will always be found true economy to be liberal in the first preparation of the soil; for after a garden is laid out and permanently planted, improvements are always made with greater difficulty and expense.

Inclosures.—The cheapest and most ordinary kind of

inclosure for gardens, in this country, is the tight board fence, and the picket or paling fence. The former should be made of stout cedar posts, set at six feet apart and three or four feet in the ground, the ends being previously charred, or covered with hot gas-tar, to increase their durability, connected in the middle and on the top with cross-bars, or rails, which may be two by four inches. The boards should be well seasoned, matched, and securely nailed to the cross-bars. Where the fence is required to be higher than the posts, the boards can extend above the top rail two, three, or even four feet, if necessary. The picket or paling fence is made in the same way, as far as the framework, posts, and cross-bars go; but, instead of matched boards, pickets, from three to six inches wide, and pointed on the top, are used, and a space of two inches left between each. Where the proprietor can afford the expense of a brick or stone wall, it will prove the most permanent, and, in the end, the cheapest inclosure. The height of the fence or wall depends somewhat on the extent of the garden. In ordinary cases, eight or ten feet are the proper height, but when the garden is very small, five or six feet are enough; and the open paling will be preferable, except on the north side, to the tight board fence, as it offers less obstruction to the air and light. A high fence around a very small garden, besides being injurious to vegetation in it, looks quite out of character, giving to it the appearance of a huge box. Live hedges, as recommended for orchards, might be employed around country gardens of considerable extent, say an acre or upwards, but they require to be kept in the neatest possible condition.

Trellises.—In England, and other parts of Europe, where the summer temperature is not so high as it is here, espalier trees are trained directly on the garden walls or fence; but our hot sun renders this unsafe, except in the case of the grape, or on the north sides of the walls. The

sun strikes the south side of a fence with such force that the foliage in contact with it is burned. It is therefore necessary, where the walls or fences are to be occupied with espaliers, to erect suitable trellises at the distance of six to twelve inches from them, on which to train the trees. The form of these differs according to the nature of the subject to be trained. They are generally made of upright and cross-bars, of inch boards, three inches wide, placed within six to twelve inches of each other, according to the growth of the species; the larger the foliage and the longer the shoots, the greater may be the distances; thus, the grape twelve inches, and the peach eight. Sometimes they are constructed of wooden bars and wire rods alternately; these answer a good purpose for the grape, as it fixes itself to the wires by the tendrils. The trellis is fastened to the wall by iron hooks, and should stand a little farther from it at the bottom than at the top, for the purpose of giving the tree a better exposure to the sun, rain, etc. Fruits are grown so successfully in this country in the open ground that walls or trellises are seldom used, except to economize space. In the North, however, where the more tender fruits do not succeed in the open ground, walls may be advantageously employed, as the trees trained on them are easily protected both from winter and spring frosts.

Laying Out the Fruit Garden.—This is the arrangement or distribution of the ground into suitable plots or compartments, necessary walks, etc. The mode of doing this depends on the size of the garden, and the manner in which it is to be planted. Fruit gardens, properly speaking, are such as are wholly devoted to fruits; but a very common form, as has been already observed, is the *mixed* garden, where a portion only is devoted to fruits, and the remainder to culinary vegetables. We will first consider

The Fruit Garden proper.—In all fruit gardens the number of walks should be no greater than is absolutely

necessary for convenience. In small places, the better

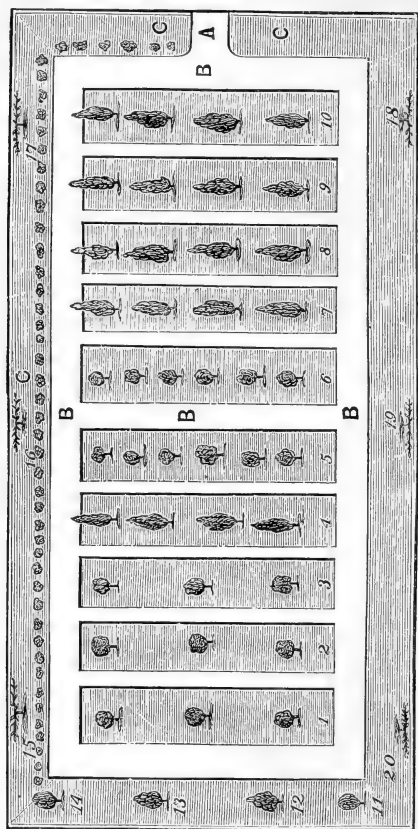


Fig. 100.—PLAN OF A SMALL FRUIT GARDEN.

plan appears to be to carry the principal walk around the outside, leaving as much as possible of the interior, where air and light are enjoyed to the greatest extent, for the trees. A border should be left between the fence and the walk, of sufficient width for the trees to be trained on the fence trellis. If appearances were to be strictly observed, this border should be as wide as the fence is high, but, as a general thing, five to six feet will be sufficient; and where

ground is limited, appearance must, in many cases, be sacrificed to economy. Where the work is all performed by manual labor, the walks need not be more than five to six feet wide, as that admits of the passage of a wheelbarrow, and this is all that is required.

Fig. 100 is a design for a very small garden, fifty feet by

one hundred. *A* is the entrance gate, four feet wide; *B, B*, a walk, five feet wide; *C, C*, fence border, six feet wide. The rows of trees are eight feet apart. The pyramidal pears and cherries, Nos. 1, 2, 3, and 4, at seven feet apart in the row. Nos. 5 and 6, dwarf apples, at four feet apart. No. 7, pyramidal or dwarf standard plums, at seven feet. Nos. 8, 9, and 10, low standard peaches, at ten feet apart, the outside ones four feet from the walk. Nos. 11, 12, 13, and 14, low standard quinces, etc. Nos. 15, 16, 17, 18, 19, and 20, espaliers, apricots, grapes, etc. One border is filled with gooseberries and currants, the other can be occupied with raspberries and strawberries. This arrangement gives in this little garden twenty pyramidal trees, thirteen standards, twelve dwarfs, six espaliers, besides space enough for two dozen currants, two dozen gooseberries, two dozen raspberries, etc. For several years a few strawberries and low vegetables, such as lettuces, radishes, beets, carrots, turnips, or even *dwarf* peas, may be grown in the spaces among the trees, but in no case to be permitted nearer than within three feet of a tree. In regard to distance between trees, my experience is, that where a good crop is of more importance than a great variety, dwarf and pyramidal trees of the pear, plum, cherry, peach, apricot, nectarine, and quince, should have ten to twelve feet. This distance would reduce the number of trees in the plan (fig. 100).

The *mixed, or fruit and kitchen garden*, is laid out in a similar manner. The trees are planted in rows, on a border six to ten feet wide, according to the size of the trees, along the walks, leaving the interior of the compartments for vegetables. This arrangement is a very common one, and generally answers a very good purpose; but where it is practicable, it is much better to devote a separate portion exclusively to fruit, in order that the one may not in any way interfere with the other. In such a garden, the number of the walks, and consequently fruit borders,

will depend upon the proportion of the ground intended to be allotted to fruit; and this again will be regulated by the means, taste, and demands of the family.

The frontispiece of this work gives the plan of a mixed fruit and kitchen garden, one hundred and fifty feet wide by two hundred long, being one hundred and ten square rods; somewhat less than three-quarters of an acre. The design is to have two tree borders exclusive of the outside or fence border. The center main walk, from *A* to *C*, is ten feet wide. That crossing it in the center, six feet wide. The small walk, next the fence border, four feet wide, and that between the two tree borders, five feet. The fence border is six feet wide, and may be planted with espalier trees, vines, etc., besides currants, raspberries, strawberries, or anything of low growth, not requiring the fullest exposure. The tree borders are all eight feet wide, except the dwarf-apple border, which is only six. The outside border is planted on the two sides with low standard or pyramidal peaches, apricots, plums, quinces, etc., at twelve feet apart, and the two ends with pyramids, at eight feet.

The inside borders are planted with pyramids and dwarfs, the former at eight, and the latter at six feet apart. *A*, is the entrance; *B*, well or cistern; *C*, a space to turn a horse and cart upon. This arrangement gives thirty standard trees, eighty-three pyramids, and forty dwarfs, leaving clear the outside border, over six hundred and sixty feet long, and six wide, and the four interior compartments, each about thirty by sixty feet. In cropping the latter with vegetables, they may be divided, as in the design, into narrow beds, three or four feet wide, separated by paths, eighteen inches wide. In gardens of greater extent, it will be well to increase the distance between the trees.

Walks in the Fruit Garden.—The number of these, as has been remarked, should be simply sufficient for con-

ducting the operations of gardening with convenience; this being provided for, the fewer the better. Where horse labor is employed, the main walk, either through the center or around the sides, should be nine or ten feet wide. Where manual labor alone is employed, as in small gardens, five or six feet will be sufficient, and even four feet, as that admits of the passage of a wheelbarrow. Between each compartment, or line of trees, there should also be a path, two or three feet wide, as a passage for the gardener or workmen, and others who may desire to inspect the trees. Where the expense can be afforded, the main walks should be gravelled, so as to be dry and comfortable at all seasons, and in every state of the weather; for it is presumed that every man who has a fruit garden, worthy of the name, will wish to visit it almost daily, and so will the members of his family and his friends who visit him. The labor and expense of making a walk depends upon the nature of the soil. If dry, with a porous subsoil, absorbing water rapidly, six inches of good pit gravel, slightly rounded on the top, will be sufficient. If the soil be damp and the subsoil compact, it will be necessary to remove the earth to the depth of a foot in the center, and rising towards the sides, so that the excavation will resemble a semicircle; this is filled with small stones, and a few inches of good pit gravel on the top. This makes a walk dry at all times. We often see very comfortable and neat-looking walks made of spent bark from the tannery; six inches deep of this will last two or three years, and no excavation is necessary in any kind of soil. It is not to be supposed that so great expense will be incurred, in any case, in the formation of the walks of a fruit or kitchen garden, as those of a pleasure ground or flower garden, and therefore it is unnecessary to suggest either costly modes or materials. The chief point is to secure dry, comfortable walking, without introducing any material that will

produce a decidedly unpleasant contrast with vegetation. This can all be accomplished by the cheap and simple means referred to, and others that may suggest themselves.

The main walks alone should be gravelled; the smaller alleys, or paths, between the different lines of trees or compartments of the garden, are principally for the use of the workmen. In very small gardens, where it is important to economize the ground, the spaces devoted to the walks may be of plank, raised on pillars or blocks a foot from the ground; the roots of trees can then penetrate the ground below the walk as well as the border, and scarce any ground will be lost.

Water.—A supply of water in the garden is a most important consideration in our warm, dry, sunny climate. Good crops of culinary vegetables cannot be secured in many seasons without a liberal application of water; and fruit-trees are greatly benefited by frequent showering, especially in dry weather. It refreshes them and drives away insects. A good well or cistern should therefore be provided in every garden, and be situated as near the center as possible, to be convenient to all parts.

SELECTION OF TREES.

Their Form.—We start upon the principle that, in all cases, tall standard trees, such as are usually planted in orchards, are totally unfit for the garden. This is the chief defect in American fruit gardening. All the trees for a fruit garden should be either *dwarf standards*, with trunks two to three feet high, *pyramids*, branched from the ground, or *bushes*, with stems six to twelve inches high. Trees in these forms are, in the first place, in keeping with the limited extent of the garden, and convey, at first sight, the idea of *fitness*. In the second place, they give a great variety on a small space, for three or four

such trees will not occupy more space than one standard. In the third place, they are in a convenient form for management; they are easily pruned or protected, and the fruit is easily gathered, and less likely to be blown off

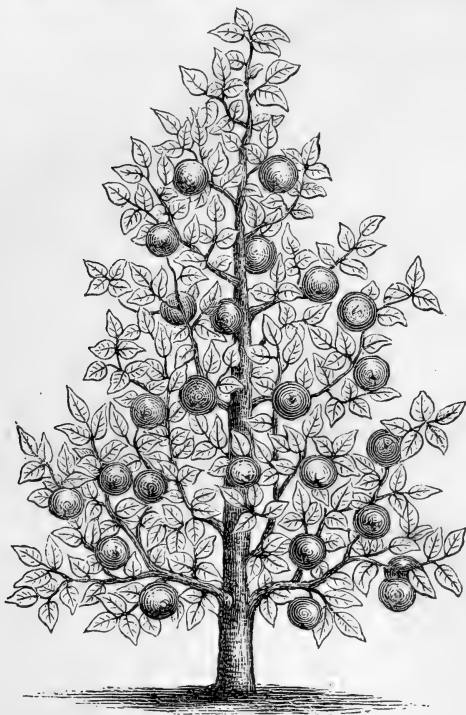


Fig. 101.—PYRAMIDAL APPLE-TREE.

than on tall trees. Finally, they bear several years sooner than standards.

Among the forms mentioned, the *pyramid* is certainly the most beautiful; and in the best fruit gardening regions of Europe, where almost every conceivable form of tree has been tried, it is to-day the most popular,

because it has proved the most advantageous and successful. The *apple for pyramids* (fig. 101) should be on the *Doucín* stock. Certain varieties, such as the *Hawthornden*, *Keswick Codlin*, *Summer Rose*, *Duchess of Oldenburg*, and many other moderate growers and early bearers, will make good pyramids on free stocks, but they will require more summer pruning and careful management to keep their vigor under check than they would on the *Doucín*. But apples for the fruit garden, even on the



Fig. 102.—DWARF BUSH APPLE-TREE.

Doucín, should be such as naturally make small trees, and are inclined to early bearing. In these respects, it is very well known there is a wide difference between varieties. Those mentioned above, and others similar in character, frequently bear, on free stocks in the nursery rows, at the age of three or four years from the bud, whilst others do not bear until eight or ten years old. This is a point that should always be regarded in selecting garden trees; for it is the natural and proper desire of every one who plants a tree in the garden to obtain fruit from it as early as possible.

The Apple for Dwarfs.—The apple, worked on the Paradise, makes a beautiful little dwarf bush. We know of nothing more interesting in the fruit garden than a row or a little square of these miniature apple-trees (fig. 102), either in blossom or in fruit. Those who have not seen them may imagine an apple-tree, four feet high, and the same in width of branches, covered with blossoms in the spring, or loaded with magnificent golden and crimson fruit in the autumn. They begin to bear the third year from the bud, and the same variety is always larger and finer on them than on standards. We have had *Red Astrachans* on Paradise that measured eleven inches in circumference. The French plant a square or compartment of these in the kitchen or fruit garden, as they do gooseberries and currants, six feet apart; they also alternate them with pyramidal pear-trees, in rows; and in some of the best mixed kitchen and fruit gardens two dwarf apples are planted between two pyramidal pears, thus giving double the number of apples as of the pears in a border or row. In small gardens, the apple should not be admitted under any other form, and even to a limited extent in that; for it is the great fruit of the orchard, and in nearly all parts of this country extensively grown, and can be purchased at very moderate rates.

Dwarf Apple trained in Horizontal Cordon.—In Eu-

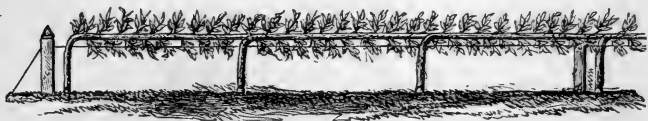


Fig. 103.—APPLE CORDON (Single).

ropean gardens, the dwarf apple is frequently trained on what are called "horizontal cordons" along the walk borders, and are very pretty objects.

The cordon, as the drawing (fig. 103) shows, consists

of single stems, or arms, trained horizontally on a wire or wooden rail, about ten or twelve inches from the ground.

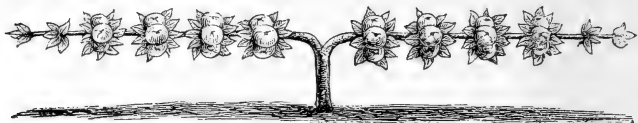


Fig. 104.—APPLE CORDON (Double).

This stem, or cordon, is kept furnished with fruit spurs, and produces fruit on its entire length. The cordon may be either single or double. The single consists of a single stem, or

arm, and the double of a pair of arms, one trained to each side, as in fig. 104.

The Pear as a Pyramid (fig. 105).

—The pear is eminently *the* tree for the pyramidal form, either on the free stock or on the quince. On the latter, however, the trees bear much earlier, are more prolific, more manageable, and consequently preferable for small gardens. On the pear stock they require constant summer pruning and pinching, and, in some cases,



Fig. 105.—PYRAMIDAL PEAR-TREE.
7 feet high ; 4 feet wide at the base.

root pruning, to subdue the natural vigor, and induce early fruitfulness. Certain varieties, however, do not succeed on the quince, but a large number of melting varieties do, and produce larger and finer fruit on it than on the free stock. The tardiness of bearing of the pear-tree, when grown in the ordinary standard form, on pear stock, has, more than any other cause, retarded its general cultivation. No better proof of this can be adduced than the general partiality now shown for trees on quince stocks that bear at the age of three or four years. The introduction of these trees, a few years ago, was really the first thing that gave a general impulse to pear-tree planting. With most people, it is a very important thing to obtain fruit in two or three years, instead of waiting eight or ten. The best management of trees on free stocks cannot bring them into a bearing state short of six or seven years, unless it be some remarkably precocious variety. People, therefore, who wish pear-trees for pyramids that are easily managed, and will bear early, will select them on quince stocks, in case the varieties they wish to cultivate have been proved to succeed well on it.

The *Cherry* is as easily managed in the pyramidal form as the pear—not only the free-growing sorts, *Hearts* and *Bigarreaus*, but the *Dukes* and *Morellos*; the latter, however, are less vigorous, and more easily managed. All should be worked on the *Mahaleb* stock; this has, to some extent, the same effect on the cherry as the quince has on the pear. After the second or third year's growth, it subdues their vigor, and induces fruitfulness. The *Dukes* and *Morellos* should be chosen where very small trees are desirable.

The Plum as a Pyramid.—The plum has rarely been cultivated as a pyramid, but recent experiments prove that it is quite susceptible of that form under proper management. It should be worked on a stock calculated

to subdue its natural vigor. The native, or Canada plum, and the Myrobolan, or Cherry plum, are suitable. Summer pruning and pinching, as well as occasional root pruning, are all necessary to check the vigor of most kinds, and keep them in suitable dimensions for small gardens where it is necessary to plant them close. Our specimen plum orchard consists entirely of dwarf standard and pyramidal trees, planted in rows, ten feet apart, and eight feet apart in the row. They were planted some twelve or fifteen years ago, and are now models of beauty and productiveness—that, too, without any summer pruning, root pruning, or pinching.

The Plum as a Dwarf Standard.—Besides the pyramid, this is the only form in which the plum should be admitted into the garden. The dwarf standard, with a trunk two or three feet in height, and a symmetrical, round head, is a very pretty and appropriate form, and requires less skill and care in the management than the pyramid; and with proper care, the trees require but little, if any, more space.

The Peach.—The best garden form for the peach in this country, generally, is that of the *dwarf standard*, with a trunk eighteen inches to two feet. With proper management, which will hereafter be described, this form is easily conducted, even when the trees are on peach stocks. The plum stock, and especially the sorts recommended for dwarf plums, give trees that are less vigorous, and more easily kept in a small space. In most parts of our country, the fruit ripens perfectly in the open ground, so that espalier or oblique cordon training, as has been remarked, is seldom practised, unless to save ground, or in northern localities, where protection of the buds during winter, or of the blossoms in the spring, is necessary. In such cases alone are espaliers to be recommended, as they require much greater care in pruning and training than any other form. Espalier trees are of various

forms, but the *fan*, as it is termed, is the best adapted to the peach. It consists of two main branches or divisions of the stem, spread out in the form of a V; each of these bears a certain number, as many as may be necessary to fill the trellis, of secondary branches, and these furnish the bearing wood. The production and management of this and other espalier forms will be treated fully under the head of pruning and training.

The Apricot and Nectarine.—The remarks applied to the peach apply with equal force to both these trees; they succeed equally well as low standards or as espaliers or cordons. The apricot is more generally grown in these forms than any other tree, because its early blossoms are so easily protected, and the curculio does not appear to be so troublesome to it as in the standard form.

The *Quince*, in the garden, should either be a dwarf bush, with a stem twelve to eighteen inches high, and a compact, symmetrical head, or a pyramid. In the latter form it is quite easily trained, but requires more care, of course, than as a bush, as the upper part of the tree must always be kept subordinate to the lower, and this requires regular and constant attention. No fruit tree is more neglected than the quince, and yet it is a profitable and most beautiful tree, either in blossom or fruit. It well repays the care required to keep it in proper shape.

The Filbert.—The remarks on the quince may be applied with equal propriety to the filbert, as regards form. The *bush*, branched from the ground, and the *low standards*, with two-foot stems, are the ordinary forms; but in some of the French gardens it is conducted with great success as a pyramid.

These are the principal trees of which it is necessary to speak in regard to form. Other species will be referred to under the head of Pruning. Having now pointed out the most eligible forms for garden trees, and their respec-

tive advantages, planters will be able to make a choice adapted to their tastes and circumstances. Those who do not employ a professional gardener, and who have but a small portion of spare time to devote to their garden, should by all means adopt such forms for their trees as require the least skill and labor, provided always that it be appropriate to the size of the garden, and consistent with good management.

The next point to be considered is,

The Age of the Trees.—This will depend very much on circumstances. For pyramidal trees it is yet difficult, almost impossible, to obtain in the nurseries specimens of more than one year's growth that are suitable. The yearlings are never sufficiently cut back, nor the branches of the second and third years so managed as to have the requisite proportion of length and vigor to fit them for being moulded, with any ordinary treatment, into a perfectly pyramidal form. If suitable trees cannot be found of two or three years from the bud or graft, vigorous yearlings, worked at the ground, should be chosen, as they are in a condition to take easily any required form; and though fruit may not be soon obtained from them, yet they will, in the end, be much more satisfactory; for, unless a right beginning be made in the training of a tree in any form more or less artificial, no art can afterwards completely correct the errors. If we take a two or three year old tree, managed in the nursery, as usual, with a naked trunk, two to two and a half feet from the ground, and a branching head, or, what is nearly as bad, a few weak side branches below, overrun with strong ones above, the most severe process will be necessary, in order to produce lateral branches in the proper place; and thus as much time will be lost as would bring forward a yearling, and the tree will not be so perfectly formed, nor in any respect so satisfactory. The general impatience that exists in regard to the growth and bearing of trees is the

great cause of this defective character when taken from the nursery. The nurseryman is averse to cutting back his trees, as they lose a year in height; and planters or purchasers are not generally discriminating enough to be willing to pay him a proportionate price. He finds tall trees more attractive. When planters do get these trees, they cannot be persuaded to cut them down; they wish to obtain fruit as soon as possible, and therefore the tree is allowed to proceed in the defective form it assumed at the nursery.

For *Dwarfs* and *Dwarf Standards*, it is less difficult to obtain the right sort of trees, for this is the form that nursery trees that have not been cut back, ordinarily assume. Those, therefore, who prefer such trees can always be supplied with them well advanced, even in a bearing state, if so desired. As in the pyramid, however, persons who intend to make models of their trees, will do well to procure yearlings worked at the surface of the ground, for on them, heads or lateral branches can be formed without any difficulty at any desired point between the collar and terminal bud. Another consideration is worthy of note on this point. There is a much greater risk in removing three or four year old trees than yearlings, and they are more difficult and expensive to pack and transport. The yearling is easily removed and easily transported, and its growth is comparatively unaffected by the change. The gardeners most famous for their handsome, well-managed fruit trees, invariably select yearling trees, that is, trees that have made one year's growth from the bud or graft. But it is not always practicable to procure trees of this age, as few of them are called for, and nursery-men dislike to break upon their young stock before it has attained the usual marketable age.

Selection of Varieties.—The selection of varieties of fruits for a fruit garden should be made in view of all the circumstances that can affect their usefulness. They

should be adapted to the soil, and more particularly to the climate. It is well known that in every section of the country, certain varieties seem to succeed remarkably well, whilst others, of the greatest excellence elsewhere, entirely fail. Our country is so extensive, and embraces such a variety of climate, that it is impossible that the same varieties should succeed equally well in all parts; and planters should consider this well. Those who have had no experience in cultivation, nor a proper opportunity for acquiring knowledge on this point, should consult others. Any intelligent nurseryman who has a correspondence with all parts of the country, and is thoroughly alive to all the branches of his profession, and the results of experience, can aid planters greatly in making appropriate selections. It is true that the amount of knowledge collected on this head is yet comparatively small, and quite insufficient for a general guide, but it is every day accumulating, and what there may be is well worthy of attention. The experience of fruit growers, as elicited at recent pomological conventions, has brought to light a multitude of highly important facts, bearing on this very point. These will be more particularly noted when we come to the *description* of fruits.

Varieties should be adapted in their growth to the form they are to be grown in, and to the extent of the garden.—For pyramidal trees, varieties should be chosen whose habits of growth are regular, or slightly spreading, the branches assuming more of the horizontal than the upright, and those disposed to branch low down should be preferred to those of an opposite habit. Where the garden is small, moderate or slow growers should be preferred to rapid and vigorous growers. They should also be well adapted to the stock on which they are worked. This is a very important point, but one on which only a few persons in this country have yet acquired any considerable amount of actual experience. Still, many im-

portant facts have been gathered, and it becomes every planter to avail himself of them. If he plants pears on quince stocks, for instance, it is important to know that certain varieties are much better on that stock than they are on the pear, and that others fail and are worthless on it.

The varieties should be adapted to the wants and wishes of the planter.—Those who plant fruit gardens have not all the same objects in view. One man plants his garden simply to supply his family with good fruits. This is his main purpose. He should, therefore, select the very best varieties, considering not the *quality* alone, but their productiveness and other useful properties. Such a person has no desire for a large collection, but looks merely for an assortment that will yield a succession of ripe fruits during the season. Another, who regards the mere value of the fruit *less* than amusement, recreation, and experiment, will make his collection as varied as possible. Where any particular class of fruits can be had very cheap in market, it should be planted sparingly in the garden, so that such as may be scarce or dear can be grown in larger quantities. It is only by taking all these into account that planters can hope to make their fruit garden answer their particular views and purposes.

The planting of a fruit garden should be considered as of equal importance with the building of a dwelling, so far as the doing of it well is concerned. The dwelling is constructed with a view to the convenience of the family, and is, therefore, in all its parts, supposed to be adapted to their wants and mode of living. The fruit garden is intended, also, to promote the comfort and convenience of the family, and should be, like the dwelling, in all respects as nearly as possible adapted to their wants and circumstances. Having now treated of the soil, inclosures, trellises, walks, arrangement, selection of trees and varieties, we proceed to the taking up of the trees and planting.

Taking up the Trees.—This has already been described under the head of Nursery Operations, to which the reader is referred.

Planting has been described under the head of *Planting the Orchard*; and the operation being the same in both cases, it need not be repeated.

The arrangement of the trees, however, is different, and this point requires a special notice.

In regard to position.—Each class of trees, such as pears, apples, cherries, etc., should be planted together in the same rows or division, and if any difference exist in the soil, each should be planted in that best adapted to it. Thus, plums should have that most inclined to clay; pears and apples, the deepest and richest; cherries, peaches, apricots, etc., the driest and lightest.

Where the garden is large, the pyramids should be in one compartment, the dwarf standards in another, and the dwarf bushes in another; but where it is necessary to economize and fill the ground to the best advantage, the dwarf bushes may alternate advantageously with the pyramids or dwarf standards, and this especially along the walk borders. Varieties, too, of the same or similar habits of growth, should, if possible, be together. The espalier trees should be placed so that the earliest blossoming kinds, such as the apricots, will be most secure from the influence of spring frosts where these prevail; the trellis facing the north will be the best for this purpose; but where it is intended to protect them, the aspect is of little account. In the north aspect, fruits are very much retarded in their ripening; and this circumstance may be turned to a good account to prolong the season of some late cherries, currants, etc. We have seen fine Morellos in perfection on a north wall here, in the month of September.

The distance at which trees should be planted in the garden.—This will not be the same in all cases; for in a

large garden it is not necessary to plant so close as in a very small one, and in a very rich and deep soil a greater distance will be required than in a dry and light soil. There is also a great difference in the growth of varieties. Some might be planted at six feet apart, and have as much space in proportion as others would at eight. This shows that no rule, as regards distance, can be observed in all cases, and this particularly in small gardens, where advantage should be taken of every circumstance. In large gardens, a uniform distance may be adopted, even if some space be sacrificed. The following distances may serve as a general guide, and may be increased or diminished according to circumstances :

DISTANCE IN THE OPEN GROUND.

Apples.—Pyramids, on free stock, ten feet apart; do., Doucin, eight feet apart; do., dwarf standards on Doucin, ten feet apart; do., dwarf bushes on Paradise, five or six feet apart.

Pears.—Pyramids on free stocks, ten to twelve feet apart; do., on quince, ten feet apart; do., dwarf standards on quince, eight to ten feet apart.

Plums.—Dwarf standards, eight to ten feet apart; do., pyramids, eight to ten feet apart.

Cherries.—Pyramids, Hearts, and Bigarreaus, eight to ten feet apart; do., Dukes and Morellos, six to eight feet apart; do., dwarf bushes of Morellos, five to six feet apart.

Apricots.—Dwarf standard on plum, eight to ten feet apart; do., pyramids, six to eight feet apart.

Peaches.—Low standards on peach, ten to twelve feet apart; do., on plum, eight to ten feet.

Nectarines.—Same as peaches.

Quinces.—Pyramids or bushes, six to eight feet apart.

Filberts, six to eight feet apart.

Gooseberries and Currants, four or five feet apart.

Raspberries, two to three feet apart.

Mr. Rivers gives the following distances in his "Miniature Fruit Garden":

Pyramidal Pear-Trees, on quince stocks, root-pruned for small gardens, four feet apart. The same, in larger gardens, not root-pruned, six feet apart.

Pyramidal Pear-Trees, on the pear stock, root-pruned, six feet apart. The same, roots not pruned, eight to ten feet—the latter if the soil be very rich.

Horizontal Espalier Pear-Trees, on the quince stock, for rails or walls, fifteen feet apart.

Upright Espaliers, on the quince stock, for rails or walls, four to six feet apart.

Horizontal Espaliers, on the pear stock, for rails or walls, twenty to twenty-four feet apart.

Pyramidal Plum-Trees, six feet apart.

Espalier Plum-Trees, twenty feet apart.

Pyramidal Apple-Trees, on the Paradise stock, root-pruned for small gardens, four feet apart. The same, roots not pruned, six feet apart.

Espalier Apple-Trees, on the Paradise stock, fifteen feet apart. The same, on the crab stock, twenty to twenty-four feet apart.

Peaches and Nectarines for walls, twenty feet apart.

Apricots for walls, twenty-four feet apart.

Cherries, as bushes on the Mahaleb stock, roots pruned for small gardens, four feet apart. The same, roots not pruned, six feet apart.

Espalier Cherry-Trees, on the Mahaleb, for rails or walls, twelve to fifteen feet apart.

Oblique Cordon Trees, of all varieties, two to three feet apart.

Horizontal Cordons, of all varieties, ten to twelve feet apart.

DISTANCES FOR ESPALIER TREES ON WALLS OR TRELLISES.

The distances between espalier trees must be regulated not only by the growth of the species and variety, but by the height of the walls or trellis. If these be low, a greater length, of course, will be necessary than if high; for every tree must have a certain extent of surface to be spread upon. Hence, if a trellis be only eight feet high, nearly double the length, and, consequently, double the distance between the trees, will be required that would be on a trellis fifteen or sixteen feet high. As a general thing, *peaches*, *apricots*, or *nectarines*, on walls or trellises eight or ten feet high, should be fifteen to twenty feet apart, if on free stocks, and twelve to fifteen if dwarfed on the plum. *Cherries*, ten to twelve feet. Our *Native Grapes*, *Isabella*, *Catawba*, etc., at twelve to fifteen feet apart, on an eight-foot-high trellis. Foreign varieties will not require half this; indeed, the better way is to keep these trained to simple stakes, and planted in the border, where their out-door culture is attempted. In this way they are easily laid down and protected.

CHAPTER II.

PRUNING AND TRAINING APPLIED TO THE DIFFERENT SPECIES OF FRUIT-TREES UNDER VARIOUS FORMS.

SECTION 1.—PRUNING THE APPLE AND THE PEAR.

These two trees belong to the same genus, *Pyrus*; their habits of growth and bearing are similar, and they may therefore be treated, as regards their pruning, under the same head.

If we take, for example, a shoot of last season (fig. 7), we find it, in the spring, before vegetation commences, furnished on all its length with wood-buds; when growth commences, the terminal bud, and probably two or three of the others nearest to it, produce shoots; the others towards the middle produce small shoots that are, in subsequent years, transformed into fruit branches (like fig. 10). Some do not push at all, but are converted into fruit-buds (as in figs. 8 and 9), whilst those at the base generally remain dormant, until excited into growth by close pruning. All the buds on these trees have small, inconspicuous buds at their base, which are capable of producing shoots when the principal bud is destroyed or injured, and these buds render the fruit-spurs so enduring. In young trees, the fruit-buds are many years in process of formation, and in bearing trees, three to four years, according to circumstances. When the trees are not subjected to pruning, the result of the mode of growth described is, that the terminal buds grow and form one section upon another, leaving the lower parts mainly des-

titute of bearing wood, unless it be an occasional spur, the sap always tending to the points.

Standards.—The management of this form of trees has been fully treated of in all our works on fruit culture, and in all the agricultural and horticultural journals, so that now it is pretty well understood, and especially by those who give considerable attention to the subject of fruit-trees; it will not be necessary, therefore, to enter upon much detail in regard to it.

A standard apple or pear tree, for the orchard, when taken from the nursery to be finally planted out, we will suppose to have a straight, stout trunk, four to six feet in height, as the case may be, and a head composed of a certain number of shoots or branches, but generally shoots of one year's growth. At the time of planting, three or four of these shoots should be selected to form the main branches, or frame-work, on which to build the whole head, and the remainder cut clean out; those reserved should be cut back full one-half, and from the shoots produced on these, at and below the cut, two of the strongest are selected, each on opposite sides, and the others are rubbed off while they are soft. In selecting these shoots, care must be taken to have them equally distant from one another, and pointing in such directions as not to cross or interfere.

During the first season, these young shoots must be watched and kept in a regular state of vigor. If any threaten to become too vigorous, they must be pinched and checked at once, so that perfect uniformity be preserved. This is the time to secure a well-formed and nicely-balanced head. A very slight circumstance sometimes throws the growth into one side or one branch of a young tree, and produces a deformity from which it never recovers. The trunk must be kept clear of all shoots, by rubbing off such as appear at the earliest possible moment, when it can be done without the use of a knife. Suppos-

ing we commenced the head with three branches at time of planting, there will be, at the end of the first season, six.

The attention required after this will be to maintain an uniform growth among these six branches, and their members and divisions, and to prevent the growth of shoots in the center. The leading defect in all our orchard trees is *too much wood*, the heads are kept so dense with small shoots that the sun and air are, in a great measure, excluded, and the fruit on the outside of the tree only is marketable or fit for use. The head should be kept open, rather in the form of a vase, so that the wood, leaves, blossoms and fruit may all, on every part, enjoy the full benefit of the sun and air, without which they cannot perform their functions, or attain maturity and perfection.

Too many people imagine that trees can take care of themselves, as trees in the forest, on the ground that nature preserves a balance in all her works; but it should be borne in mind that a fruit tree is not exactly a natural production. It is far removed from the natural state by culture, and the farther it is removed, that is, the more its nature is refined and improved, the more care it requires. Fig. 108 represents a young standard pear tree. stem four feet high, and the head twice cut back, as at the letters *a* and *b*.

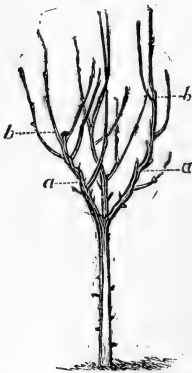


Fig. 108. — A YOUNG STANDARD PEAR-TREE.

Trunk 4 feet high; head forward on three main branches, twice pruned at *A* and *B*.

Pinching.—If this be properly attended to, very little knife pruning will be necessary, except to shorten the leading shoots, because as soon as a superfluous or misplaced

shoot appears, it is rubbed off, and when one becomes too vigorous, it is pinched and checked. The great advantage of pinching is, that

1st. It economizes the sap of the tree. That which would be expended on superfluous shoots is turned to the benefit of the parts reserved, and thus the growth is greatly promoted.

2d. All wounds necessarily inflicted, where knife-pruning is depended on, are completely avoided. These facts should be remembered. Standard apples and pears are not generally pruned with a view to hastening their bearing, but are allowed to arrive at that state in their natural way. In the case of tardy-bearing sorts, however, it *may* be desirable to apply artificial means, and these will be pointed out in treating of dwarfs and pyramids hereafter.

Dwarf Standards.—These are similar to standards, except that the trunks are low, not over two or three feet in height, and the head is retained in a smaller space. Their management is always much easier when the stocks are such as to dwarf or restrain the growth. Thus, apples on the *Paradise* or *Doucin*, and pears on the *quince*. The main branches, or frame-work of the head, are produced by cutting back the three or four branches that form the head of the tree as it comes from the nursery, in the same manner as recommended for standards.

The *first season*, all superfluous productions are rubbed off, and a balance maintained among the shoots by pinching.

The *second year*, in the winter or spring, the shoots of last season are shortened, say one-half, as a general thing. This induces the development of the buds on their lower parts. The cut is made at a good, plump bud, capable of producing a vigorous shoot; and this is selected to prolong the branch. If one or two secondary branches

are needed to fill up a space, those next the leader, if properly situated to fill the space, are chosen, and all below them are pinched when about two or three inches long, in order to check the production of wood where it is not wanted, and to convert them into fruit branches or spurs. The growth of all the main and secondary branches is regulated and balanced by pinching; and if the pinched shoots, intended for fruit spurs, start again into growth, they must be again pinched.

The *third season*, the shoots of the previous year are cut back as before, say to four, five, or six eyes, according to their strength. One shoot is chosen to continue the prolongment of the branch, and the others are pinched in season to convert them into fruit spurs. Thus the tree is conducted from year to year, until it has attained the full size required. In this way the trees commence bearing quite young, and every branch is furnished, in all its length, with fruit spurs.

Pyramids.—Under the head of “the selection of trees,” it has been recommended to obtain thrifty yearling trees in preference to older ones, not properly managed. We will, therefore, begin with the yearling tree, and although the management of the first year after cutting back has been given in the nursery, it may be well to repeat it here, to save the reader the trouble of referring back.

Objects of cutting back.—The object in doing this is to produce branches near the stock, that will form the base of the future pyramid. If left entire, the tendency of the sap to the extremities would produce shoots there only, leaving a naked space entirely inconsistent with the form in view. We therefore reduce the stem to such an extent, that but a small number of buds are left on it, and the sap, acting on these with great force, causes their development.

How far to cut back.—It is obvious that this must depend on the character of the subject. In yearling plants,

both of the pear and apple, there is presented a great difference in different varieties. Some invariably produce lateral branches the first season. The buds are so perfectly developed, that when the second growth takes place in mid-summer, they break, and form branches, in some cases as much as a foot long, and in others only a few inches. Then, among the varieties which do not thus produce side branches in the second growth, there is a great difference in the plumpness and prominence of the buds. In some they are larger, and stand out boldly from the wood on the whole length of the stem, apparently ready to push under the least excitement. In others they are small, lie flat to the wood, and have every appearance of being difficult to excite into growth, and especially those towards the base. It should always be borne in mind that it is better to cut *too low* than *not low enough*. The difficulty of cutting too low is, that the shoots produced are nearly all of equal length, and a certain number of them require to be checked to give each one its proper dimensions. The difficulty of not cutting low enough is, that where we should have branches at the base, we have none, or, if any, they are smaller, instead of larger, than those above them. The remedy in this case is more difficult than the other. The vigorous shoots at the summit must be checked, and even the leading shoot, in order to throw back the sap into the lower parts, to act upon the buds there. The error which produces such a difficulty is very common, as we know by experience, among persons not familiar with the growth of young trees or the development of the buds on their stems. It must be laid down as a general rule that *the more feeble the plant, and the smaller and the more imperfectly developed the buds, the lower it is necessary to cut*.

The condition of the roots, too, must be taken into account; for where the roots are weak, broken, or injured,

and consequently unfit to yield to the stem any considerable amount of nutriment, the buds will break with less force, and a more severe retrenchment will be necessary.



Fig. 107.

A yearling pear-tree without branches. The cross-line indicates the first pruning or cutting back.

All these circumstances must be considered. For example, we will take a young pear-tree, of one year's growth from the bud, without branches (fig. 109), which we will suppose to be four feet, which is the ordinary average height of yearlings. If the buds are full and prominent on it, we cut to a good bud, about twenty inches from the stock; but if the buds are less prominent, cut to fifteen or eighteen inches, and if *very* feeble, with small buds, cut to within twelve inches, or five or six buds of the stock. If the roots have been injured much, and the stem somewhat dried or shrivelled, it should be cut to within three or four buds of the base. These different cases are mentioned because it frequently happens that persons who live at a great distance from nurseries often find their trees, on their arrival, in the condition described, and it is necessary that a course of treatment for them should be indicated. The bud cut to should, if possible, be one of the best on the stem, and be on the side of the tree opposite that in which the bud was inserted, so as to continue the stem in a straight line.

It is a great advantage to have a tree well established in the ground before cutting it back, to produce the first branches to form the pyramid; because, in that condition, it is capable of producing vigorous shoots the first season. It

is on this account that a young tree, cut back in the nursery, presents a much more perfect form, at the end of the second year, than those that have been transplanted. Some good cultivators advise to defer the cutting back for the formation of the permanent branches until the plant has stood one year after transplanting; but this course is attended with many difficulties, and, on the whole, it is better to cut back when the tree is planted, even if we obtain but a moderate growth; for the older the buds are on the lower part of the tree, the more obstinate and unmanageable they are. If we fail to accomplish our ends in the first cutting, we can repeat it the next year.

Pruning the Branched Yearling.

—Among trees of this kind, some have branches a foot or more in length, while in others they resemble short, stiff spurs, two to four inches long. These two characters require different modes of treatment. Where there are branches of sufficient force, and properly situated to form the first series of main branches, they must be treated in the same manner as though the tree were two years old. The strongest and best situated are selected and pruned to within four to six inches of their base, according to their vigor and position; the lowest should not be more than six inches from the stock. The small, feeble, superfluous ones are en-



Fig. 108.

Yearling pear-tree with branches, the pruning indicated by the cross-lines.

tirely removed; the leading shoot, which, in such cases, is short, and provided with plump buds, does not require a

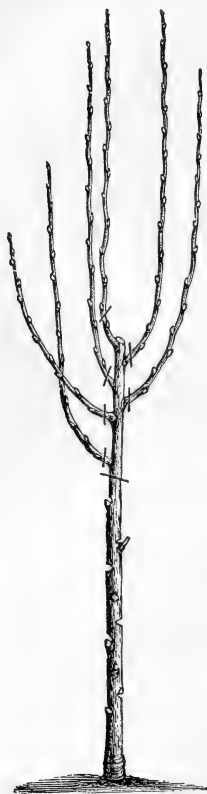


Fig. 109.

A two-year-old pear-tree, not cut back far enough the first season; the second pruning, to produce branches below, is indicated by the cross-line.

heavy shortening; in most cases, one-half will be quite sufficient. Figure 110 represents a tree of this kind; the cross-lines indicate the cuts. Where the lateral branches are short and spur-like, they will require very careful treatment; the strongest and best placed are reserved. If the lower ones have good terminal buds, they are left entire; those above them are shortened, the lower to three, the next above to two, and the uppermost, next the leading shoot, to one bud. This will give their productions a proper relative degree of vigor. The leader is cut back further than in the well-branched subject, because it is presumed the buds are less excitable—as a general thing, within four to six buds of the highest lateral, or one-half of its length.

There is another class of trees necessary to be noticed here, because they are very common—*two-year-old nursery trees that have not been properly treated*. Figure 111 represents a tree of this kind. A few inches only of the top were taken off at the commencement of the second year's growth, and after that it was left to itself. Branches, therefore, were pro-

duced only at the top, leaving a vacant space of two feet—the very part that should have produced the first

set of main branches. The best disposition to make of such trees would be to conduct them in the form of dwarf standards, which they really are at present; but it happens that, in some cases, it is desired to convert them into pyramids, and therefore it is essential that the proper means be pointed out. Two-year-old trees, like yearlings, differ materially in the character of the buds on the lower part of the stem. On some, these are quite prominent, so much so as to appear to have made some advance towards development, while in others they are quite flat and dormant. It is obvious that trees in the first condition will not require that severe retrenchment on the head, to produce branches below, as the last. In this case it will generally be sufficient, and especially if the space between the stock and first branches does not exceed two feet, to cut back the leader to three buds, and the lateral branches below it to one bud; but when the buds are small and backward, or when the branchless space is over two feet in length, the two-year-old wood must be cut back to within eighteen inches to two feet of the base. The formation of lateral branches is encouraged by cutting notches in the stem, above a bud, at the point where the branch is desired. We find that in the case of imported trees, or those carried a great distance, and more or less injured, nothing short of this severe cutting can insure branches low enough to form a pyramidal tree. It seems a great pity to cut back a tree in this manner, and lose a year or two of its growth and bearing, but it is absolutely necessary when the pyramidal form is wanted. There is still another class of trees that we sometimes see sent out from the nurseries. These are two or three years old; have been cut back, and are pretty well furnished, in all their length, with lateral branches, but, from the want of proper care, those on the upper parts have acquired greater vigor than those below, presenting the tree in a situation just the reverse, in this respect, of what

it ought to be. In pruning this specimen at the time of planting, the lower branches must either be shortened very slightly, in order to get a strong bud for a leader, or they must be left entire, while those above will be cut close; where we want the longest and strongest branches, there we leave the most wood.

The most important pruning performed upon a tree is the *first one*, for it is this which makes all future management easy and successful, or difficult and unsatisfactory. This is the reason why it has appeared necessary to treat of it so minutely. Having encountered all the difficulties that others are likely to encounter, and having described them and pointed out the means by which they are to be overcome, it is believed that the matter has been made so plain, that any man of ordinary intelligence, and possessing the slightest knowledge of tree culture, can take his knife and prepare his trees in such a manner as to give him a most reasonable hope of attaining his ends. We now proceed to the

Summer management of trees thus cut back.—We will first consider the case of the yearling without branches. If it has been cut low enough, as directed, nearly all the buds below the cut will push. As a space of six to twelve inches should be kept clear between the ground and the first or lowest tier of branches, such shoots as may appear on that part will be rubbed off at once. Of the remaining ones, a certain number, three to six, according to the length of the stem, will be reserved. These must be the strongest, and properly situated on the stem, within eight to ten inches of space between each branch, and that immediately above it, and regularly placed on all sides of the stem. Some recommend leaving on all the shoots that are produced the first season; but in certain cases this would be bad practice, for if the buds be very close, the shoots would be so numerous that the strength of all would be impaired, and much pruning would

be required the next season. The better way is to select such as are wanted, and rub off the others; the sap which they would have appropriated will be turned to the account of the permanent branches, and increase their vigor. The leading shoot must be directed in a straight line; in some cases a support may be necessary. If the branches immediately below it are so vigorous as to interfere with its growth, they must be checked by pinching. In some cases it may be necessary to do this when they are an inch or two in length. It sometimes occurs that the bud cut to is injured by the weather, close cutting, or some other cause, and pushes so feebly that the laterals below it, having more vigor, take the lead. This must be prevented in time. A proper relative degree of vigor must be maintained among all the branches by checking, when necessary, the most vigorous.

The first summer's treatment of the branched yearling (fig. 112) will consist in maintaining a uniform growth among the lateral branches, and in the case of the leading shoot, as already described. Some lateral shoots will be produced on the branches, and these must all be pinched at an inch or two, as it is yet too soon to allow of the formation of secondary branches. The sum-



Fig. 110.

A two-year-old pear-tree, having made one year's growth after the first pruning.

mer treatment of the two-year-old tree, fig. 110, will be conducted on the same principles. The encouragement of the leading shoot will require special attention to secure it in an upright position, as, in many cases, where two-year-old wood is cut back, the leading shoots assume a horizontal or curved direction.



Fig. 111.

Pear-tree three years old, twice pruned; the third pruning is indicated by the cross-lines.

The Second Pruning.—

We have now a tree composed of two sections; the first is the two-year-old part, furnished with lateral branches; and the second, the leading shoot produced last season (fig. 113). In pruning it, our object will be to establish a new section of branches on the leader, to continue the prolongment of the lower branches, and to induce the formation of fruit-spurs towards their base. To accomplish these ends, we shorten the leader or stem, on the same principle, in relation to its character, as already directed for the yearling trees, from one-half to two-thirds its length, and sometimes more. Every

bud between the one we cut to and the base of the shoot, should push; and the bud to produce the leader should be large, perfectly

formed, and *opposite* the cut of the previous year. The lateral branches on the first section are shortened according to their vigor, always remembering that the lowest must be the longest, to carry out the pyramidal form. They should also be cut back sufficiently to insure the growth of all the buds on them. This point requires considerable care, for if not cut back enough, the interior of the trees becomes naked, instead of being supplied with shoots for bearing spurs; and if cut back too far, the shoots will be too vigorous and difficult to control. The appearance of the buds, and habits of the variety, will be a sufficient guide, if properly studied. The lowest branch on the left-hand side of fig. 113, having failed to attain its proportionate growth, will be left entire, or nearly so.

Treatment of the growing shoots.—When the buds have all started, and made a growth of an inch or two, their force and forwardness will indicate the uses to be made of them. Each of the main branches of the first section may be considered as a stem; its leader will require the same treatment to favor its extension. At this time a secondary branch may be required to fill up the space, which widens as the branches extend. If so, a shoot is selected for this purpose, and all the others on the same branch are checked at two inches, and converted into fruit branches. All the laterals are treated in this way. The second section, now in process of formation, must be managed as directed for the first section. During the first season, the requisite number of shoots is preserved, and the superfluous ones removed early. The leader is maintained erect; and the laterals immediately below it, being always inclined to vigorous growth, must be checked to keep them in a proper condition, relative to the leader and the branches below them. The leading shoot must always maintain its preëminence. It often happens that the lateral shoots of the main branches that have been

pinched will start and grow again. In such cases another pinching must be performed within an inch of the previ-



Fig. 112.

Pear-tree four years old, three times pruned; cross-lines indicate the fourth pruning; will now be in a bearing state.

ous one. As a general thing, this will be sufficient; but if not, a *third* must be given in the same way; for if they be allowed to extend into wood branches, they will require knife-pruning, and create confusion among all parts of the tree. A very general error in conducting trees of this kind, and indeed all others, is to allow the branches to be too close to each other, so that when they come to bear, the wood, foliage, and fruit, on the interior, are so excluded from the air and light that they all suffer. The fruit is imperfect, and the spurs become feeble, and gradually perish. The tree has now two branched

sections, each from twelve inches to two feet, as the case may be, and with

four to six branches on each; the leading shoot is from one to three feet in length.

The average height of three-year-old trees, on the quince, in our grounds, transplanted at one year old, and twice pruned, is five to six feet. A few very vigorous-growing varieties, that throw up a leader every season three to four feet in length, are seven to eight feet; but these are comparatively few in number.

Third Pruning.—This is done on precisely the same principles laid down for the second. The leader of the stems is cut back in proportion to its vigor; the lateral branches are also shortened in the same manner. It must always be kept in mind that the lowest branches must be longest; and when it happens that they do not take their due proportion of vigor, as compared with those above them, and if pinching has not been duly attended to the past summer, to maintain regularity, the weaker must now be favored with a *long* pruning.

It has been remarked that the habits of growth and bearing of the pear and apple are similar, but it should be noted that, in treating them as pyramids, the apple-tree is more liable to lose its vigor at the top, and therefore it is necessary to keep an eye to this point in their management. From what has been said with reference to an equal distribution of the sap, the remedy for this difficulty will be obvious, viz., to reduce the vigor of the lower parts by pinching, shortening, and heavy crops, and to favor the upper part by long pruning and thinning, or wholly removing the fruits.

Management of the Fruit Branches.—About the sixth to the eighth year, from the first pruning of the tree, it will have attained nearly as great dimensions as, in many cases, will be desirable, and be well furnished with fruit branches.

After this period, the object of the pruning will be to prevent the extension of the tree, and maintain the fruit-

bearing parts in a healthy and productive state. Without proper care they will be liable to suffer from bearing too much, or from the growth of young wood on the ex-

tremities of young branches.

To diminish the growth, and favor the fruit branches, the young shoots must be pruned shorter than before, in order to turn the sap more to the benefit of the fruits, and when the fruit-spurs become too numerous, so as to be too near one another, and produce more fruit than the tree can sustain with safety, a portion of them must be pruned off. The lower parts always experience this difficulty first, the sap circulating more slowly there than in the summit. Fruit-spurs of the pear and apple, if well managed, con-



Fig. 113.—PYRAMIDAL TRAINING COMPLETE.

tinue in a vigorous bearing state for a great many years. To renew and prolong their vigor, the older parts must, from time to time, be cut away, and new productions created at their base to take their place.

Pruning and Management of the Apple as a Dwarf on the Paradise stock.

Nothing is more simple than the treatment of these little bushes.

They should have short stems, six to eight inches from the ground, and the head should not be allowed to exceed three to three and a half feet in height, because the roots are very small, and do not take such a firm hold of the ground as to admit of a head that would offer much obstacle to the wind. The branches should be evenly distributed around the head, open in the center, in the form of a vase, and be furnished in all their parts with bearing spurs.

These are the points to aim at in commencing the formation of these trees. The proceedings are as follows:

First Pruning.—We will suppose that the subject is a yearling bud or graft, a single shoot eighteen to twenty inches in height. In this case, the stem is cut back to the point where it is intended to form the head, six to ten inches, as the case may be, from the stock. Below this, most of the buds will start and form shoots, from which we select three or four of the strongest and best situated, equally distant, if possible, around the stem, and rub or pinch off all the others. The growth of the branches thus selected for a head, is encouraged during the first season, by keeping down all other productions that may appear.

Second Pruning.—The tree has now three or four branches destined to be the basis of the framework of the head. These branches are cut back full one half their length, according as the buds in the variety are easily excited or not, the object being to induce all the buds below the cut to push. After growth has commenced, and an inch or two of new wood been made, the shoot from the bud cut to, will be chosen as a leader to continue the extension of the branch; and if secondary branches are wanted, they will be chosen from those best situated, to fill up the ex-

isting vacancies. All the other shoots are pinched when two or three inches long, to convert them into fruit spurs, and to prevent their interfering with the growth of the wood branches. If one pinching is not sufficient, another must be given in the same way as recommended for pyramidal trees. Indeed, the whole process, as far as it goes, is the same; but the same efforts are not necessary to maintain an equal distribution of the sap, for the tree is so low, and the form so natural, that no branch is more favorably situated than another; and hence they are easily kept in a uniform state of vigor. The branches of irregular-growing sorts will require to be secured by stakes in their proper places for a year or two at first, until they have assumed a permanent position.

The third and all subsequent prunings will be conducted on the same principles as the first and second, already described, until the tree has attained its full size. Fig. 114 represents a dwarf apple-tree, four years old, three times pruned; the two last prunings are indicated by the letters *a* and *b*.

Management of the Bearing Tree.—In most cases the apple on the Paradise is disposed to excessive fruitfulness, and unless the fruit branches be occasionally thinned and shortened, in order to reduce the number of bearing buds, and to produce new wood, the tree becomes enfeebled. Bad management of this kind has promulgated the belief that the apple on the Paradise is exceedingly short-lived; but the fact that plantations exist in the most perfect vigor at the end of twelve to fifteen

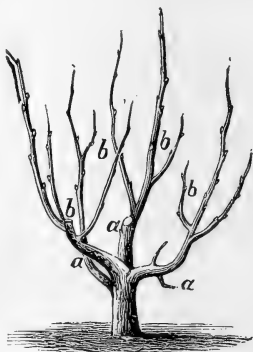


Fig 114.

Dwarf apple-tree, four years old, stem ten inches high, head composed of four main branches and several secondary branches: pruned three times, as at *a*, *b*, now in a bearing state.

years after planting, shows that by proper treatment their existence is not so fleeting. The spurs must be managed in a manner similar to that described in treating of pyramids, to renew them, and the slender fruit branches must be shortened. This, in addition to the manuring to be hereafter described, constitutes the substance of their management.

The Pruning and Management of the Apple and Pear as Espaliers.—In the cool, moist climate of England, this is a popular and advantageous method of training apples and pears. The specimens of this kind in public and private gardens there, are admirable in their way, and illustrate the skill and handiwork of the English gardener very favorably. The best espalier for the apple and pear is that of the *horizontal*, that is, an upright central stem, with

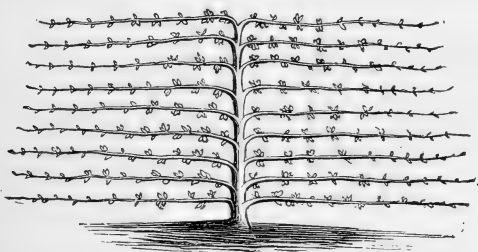


Fig. 115.—PEAR-TREE TRAINED HORIZONTALLY.

horizontal arms or branches at equal distances on both sides (fig. 115). The production of this tree depends in the main on the same principles as the pyramid, and does not require illustration. The young tree is cut back to within six inches of the ground. From the shoots produced below that point, three are selected, the upper one to form the upright leader or stem, and two lateral or side ones to form the two first arms. The first season these shoots are allowed to grow upright and are kept in equal vigor. At the commencement of the second season

they are all cut back far enough, say one third to one half their length, or even more in some cases, to insure the growth of all the buds.

The upper shoot on each is selected for a leader, and the others are pinched at two inches or less. After the pruning, the arms are brought down half way to a horizontal position, and towards the latter end of the season, wholly. A uniformity of growth among all the parts is maintained according to the means and principles already laid down, and year after year the tree is thus treated until the requisite height and number of horizontal arms or branches be obtained. In the case of very vigorous growing sorts the leader may be stopped in June, and thus a second pair of arms be produced in one year. The upright leader and the branches are treated in a similar manner—a difference in vigor always requiring a corresponding difference in treatment. For espaliers, the apple should be on the *Paradise* or *Doucin*, and the pear on the *quince*, because these stocks all diminish the vigor of wood growth, which is often the chief difficulty in managing trained trees.

The aspect for these trees should never be due south. A railing to train such trees on, is made of upright posts sunk in the ground, and connected with cross-bars, at eight to twelve inches apart, upon which the arms of the espalier are fastened with willow or bass matting. Mr. Rivers, in his "Miniature Fruit Garden," exhibits a system of growing pears in espalier, in the form of pyramids, as adopted by himself. I saw these trees when in England, in 1849, and although it appeared a very ingenious and economical arrangement, admitting a great number of varieties in a small space, and besides very well adapted to an English climate, yet it did not appear to offer any advantages that would warrant its recommendation in this country, unless under rare circumstances in the most northern sections. Whoever will study attentively the

means described for conducting a pyramid, can succeed fully in training the espaliers or wall pyramid.

THE PEAR IN WINE-GLASS FORM.

Captain Wm. K. Austin, of Dorchester, Mass., has very successfully adopted a method of training his dwarf pear-trees, which he calls the "wine-glass pattern." Hovey's Magazine of Horticulture, February, 1865, contained a full account of this method of training by Captain A. himself, and I extract from that the following condensed statement:

"I take good, thrifty dwarf trees, say two years from the bud; I set them out in April, eight feet apart, in rows, and the rows twelve or fifteen feet apart. I cut off the top, or head it back, cutting out the center leader, if any, and prepare the tree for a *low start*. The first season the growth is usually small, but the second spring (a year from planting) they are prepared to start vigorously, and must be headed back or cut in, and the tree formed this second summer into the form you desire it to take. A certain number of leaders, ten or twelve, may be allowed to grow, the lower ones about eighteen inches from the ground, with a clean stem below that.

"Nothing but these *leaders* are allowed to grow—no central leader, but all equally distributed. All side shoots and spray are kept down by nipping or cutting off with very light shears, leaving always three or four leaves at the base of the twig.

"These leaders, having all the sap, grow fast, and must be topped, when too long, about the 10th of July, or sooner, if necessary, to check and concentrate the energies of the tree, and stock it up. This may have to be repeated more than once, but if topped too early, the tendency is to throw out more side shoots, and increase the labor. After the 10th or middle of July, the growth

becomes sluggish during the hot weather, and if in the

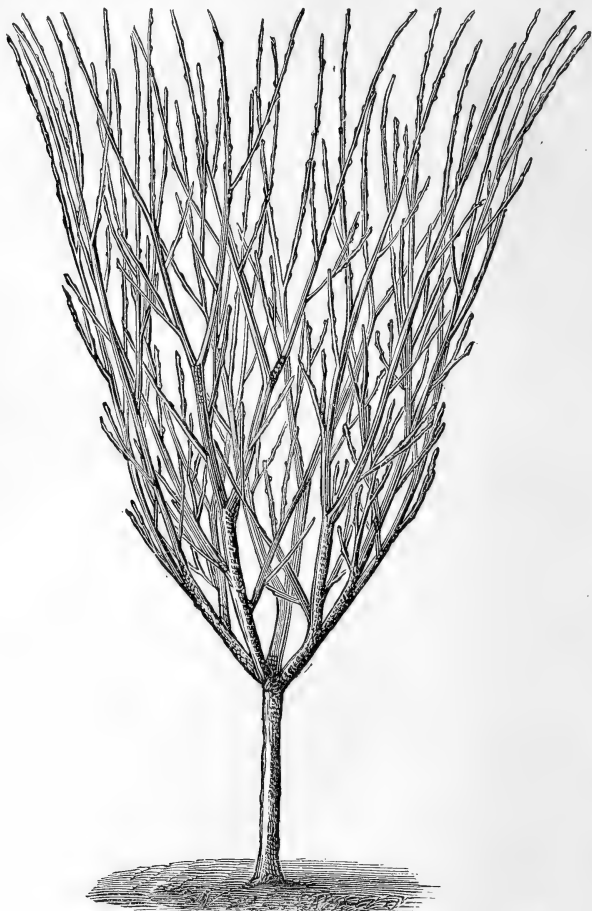


Fig. 116.—PEAR-TREE TRAINED IN WINE-GLASS FORM.

fall they start to growing again, the same process must be repeated, and thus all the pruning is done during the growing season.

"This being done each year, the tree is constantly in shape; no saw is required to remove large limbs and waste its energies, and no sap lost in superfluous growth. The wood being exposed to the sun and air, ripens well, and predisposes to the production of fruit spurs and buds, and thus early bearing is secured."

I saw these trees of Captain Austin's not long ago, and was delighted, not only with the symmetry, regularity, and naturalness of their form, but with their vigor, health, and productiveness.

It is really a model pear garden. The system is exactly that pursued by the French in the management of their "cordons," and Captain Austin's "leaders" are "cordons." His "wine-glass" trees are like the French "vase," or "goblet," but less artificial. Captain Austin does not tie or restrain the branches in any way, but leaves them free to spread after their natural habit, and that is one feature of the system that, in my opinion, adds much to its value.

CORDON TRAINING.

M. Dubreuil says that, "with all the progress we have made in arboriculture, in the employment of means for the speedy attainment of certain ends, it still requires sixteen to eighteen years to perfect the form of an espalier pear-tree in any of the large designs, such as palmette, fan, etc., which cover from thirty to sixty square feet of wall (eighteen to twenty metres).

"Add to this the labor, care, and skill required to obtain these forms in perfection, and the means necessary to maintain an equal growth and vigor between the different parts of the tree, objects which are so complicated that a large number of gardeners fail in their execution.

"Struck by these difficulties, we have sought to remedy them by suggesting a new form which, much less difficult to establish than any of the others, permits the surface of

a wall to be covered much sooner, and brings the trees into full bearing at a much earlier period, without abridging their duration. We have given to this new method, invented by us, for the pear, in 1852, the name of 'Cordon Oblique Simple.' Its application is made as follows:

"Take young trees, one year from the graft or bud, healthy and vigorous, having single stems; plant about eighteen inches apart, and incline one from the other, at an angle of about 60° .

"Each one is cut back one-third its length, above a bud, in front, as at A, fig. 117. During the summer following, the development of the terminal shoot is favored as much as possible, and all the others are transformed into fruit branches or spurs by the aid of these operations, recommended for the same purpose, in training the pear as a pyramid. In the spring following, each of these young trees presents the aspect of fig. 118.



Fig. 117.—OBLIQUE CORDON
PEAR—FIRST YEAR.

"The second pruning consists in applying to each of the lateral branches the care necessary to transform them into fruit-spurs, and to cut

back one-third the new terminal shoot. The summer treatment will be like that of the preceding.

"At the third pruning, the young stem should ordinarily attain two-thirds its entire length, when it should be brought down to an angle of 45° with the surface of the ground; and the terminal shoot and laterals are subjected to the same operations as in previous seasons. If these trees had been brought down at first to an angle of 45° , it

would have promoted the growth of strong superfluous shoots at the base, to the detriment of the terminal shoot.

"To complete these trees, it remains only to continue to prolong the stem, by means of the operations described, until it reaches the top of the wall. Having reached that, the stems are cut, each year, about fifteen inches below the coping of the wall, in order to make place for the annual growth of a vigorous shoot, which will cause the sap to circulate freely through the whole extent of the stem."

"As to the side of the horizon towards which the tree should be inclined, this is a matter of no importance where the walls run east and west; but for those north and south, the stems should be inclined to the south; the fruit branches on the lower sides will thus be better exposed to the light. It is recommended, however, that where the walls are situated on sloping ground, the trees should be inclined towards the summit of the slope, otherwise they would attain the top of the wall too soon.



Fig. 118.—OBLIQUE CORDON PEAR—SECOND YEAR.

"The trees being planted about eighteen inches apart, it results that the espalier, when complete, is composed of branches, lying parallel, with a space of about a foot between them, as in fig. 119.

"The espaliers, trained in this form, can be completed in five years, whereas, by other methods, it would require ten or twelve.

"They may begin to fruit the fourth year, and be in full bearing the sixth, while twenty years would be required by the other methods.

“Another advantage of importance is, that on the same extent of wall required for an espalier of the large kind, you can have a great many cordons, each of which may be a different variety, thus greatly increasing the interest of the plantation.

“Besides, if a large espalier tree dies, it makes a great blank on a wall, and requires a quarter of a century to

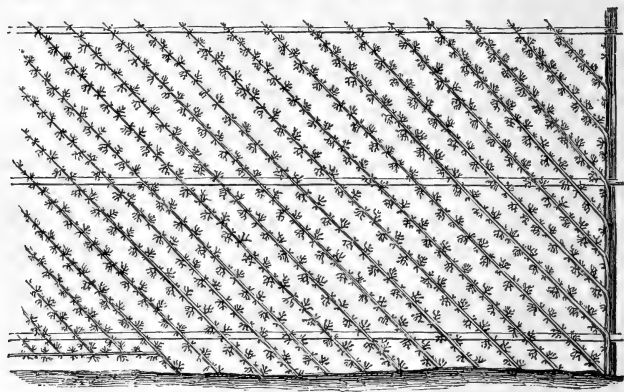


Fig. 119.—OBLIQUE CORDON PEAR-TREES.

replace it; but if a cordon dies, the blank is a small one, and very soon filled up with a new tree.

“The following objections have been urged against this form:

“It has been feared that keeping the tree in such a small space will induce such vigorous growth as to prevent fruitfulness; but this vigor being in proportion to the extent of surface of the soil to which the roots have access, and these being only eighteen inches apart, this fear must be groundless.

“It has also been suggested that trees so near one another could not live; but as the stem and branches of the trees are to correspond with the extent of soil accessible to the roots, there can be no force in this objection.

“It is farther objected that the cordon espalier is more expensive than one in the old method. This is true, as regards first expense; but against this, the operations of pruning are much more rapidly executed. We can obtain a full crop of fruit from the cordon in six years, whereas it would take sixteen or twenty by the old method. The crop of ten seasons would certainly pay many times the extra expense of the first planting.

“Finally, it is said that to give sufficient space to the stem of these trees, the walls must be of a certain height. This is true; but it will suffice if the minimum height be nine feet. We conclude, then, that for walls at least nine feet high, the simple oblique cordon is to be preferred; for walls of less elevation, the old palmette, or fan.”

TRELLISES.

The most simple trellis on which to train pear trees in this method is that illustrated by fig. 120. For a wall of

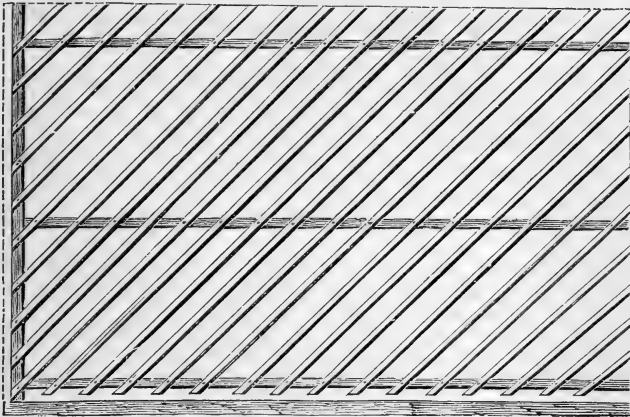


Fig. 120.—TRELLIS FOR OBLIQUE CORDON.

five feet elevation, three transverse pieces, solidly fixed against the wall, then a series of laths nailed to the trans-

verse pieces, a foot apart, and inclined at an angle of 45° . Each of these laths will be a conductor for the stem of the young tree. Galvanized wire may be used instead of lath.

SECTION 2.—PRUNING AND TRAINING THE QUINCE.

As ordinarily grown, the quince is the most neglected, and, consequently, the most unsightly, deformed tree to be found in the orchard or garden, and yet, when well treated, it is really, both when in blossom and in fruit, one of the most beautiful of all our fruit trees. Its fruit is more esteemed, and more generally used in this than in any other country. It is naturally a crooked or spreading bush, and without some attention to pruning and training when young, it assumes an irregular form, branching near the ground, and quite destitute of bearing wood on all its



Fig. 121.

B, fruit branch of the quince; *C*, the shoot produced from the fruit-bed; *A*, point at which it should be cut back after bearing.

lower and interior parts. It is in this neglected form we most generally find it. To make a regular and handsome little tree, we have only, in the first place, to rear a straight and stout trunk about two or three feet high.

If the plants be weak or crooked when planted, they should be cut low down to obtain a stout and straight stem. The young shoot should be kept tied up to a stake to prevent it from straggling.

The second year, if the growth has been vigorous, and low trees are desired, the head may be commenced. But if a stem three or four feet high be desired, it should be at least one inch in diameter, and another year's growth may be necessary.

The head is formed in the same manner as described for standard and dwarf apples and pears. It should be round, symmetrical and open, and well furnished on all parts with bearing wood.

The bearing branches or spurs of the quince are small twiggy shoots (*B*, fig. 121), produced on wood at least two years old. These bear two, three, or more fruit buds. These produce shoots two or three inches long (*C*, fig. 121), on the point of which the fruit is borne singly. These spurs have always wood buds as well as fruit buds, and therefore they should be shortened back as to *A*, fig. 121, the spring after they have borne, in order to produce new spurs at the same point.

The French train it in beautiful pyramids, on precisely the same principle as the pear and apple; but the leading shoot must be kept fastened to an upright support—a small rod attached to the base—on account of its reclining habit.

THE MEDLAR

is but little cultivated. Its treatment may be exactly similar to that described for the quince, its habits of growth and bearing being similar.

SECTION 3.—PRUNING THE CHERRY.

The cherry is trained in any desirable form with as much facility as any of our hardy fruit trees. The *heart* and *bigarreau* classes are very rapid growers, often attaining the height of six feet the first season from the bud or graft, and in two years forming fine standard trees

six to seven feet high, with a few top shoots. They have also large, drooping leaves, and, with few exceptions, stiff, erect, or slightly curved branches.

The *duke* class does not grow so rapidly. The branches are stiff and erect, the leaves smaller as a general thing than the preceding classes, more erect, thicker and of a deeper, darker green color.

The *morellos* are of a bushy habit, with smaller leaves than any of the preceding classes, and the branches are more slender and closer together. The bark of all is very tough, being composed of several layers of powerful fibres and tissue. The mode of bearing has already been described under the head of fruit branches, in the beginning of the work. The fruit is produced on wood three years old, thus: The shoot of last year's growth, which is now furnished with leaf buds in all its length, will produce at the point, if not shortened, one or more shoots, and all the buds remaining are, during the season, transformed into clusters of fruit buds, and produce fruit the year following. In the center of these clusters of fruit buds there is always a wood bud, and this grows a little and produces new clusters of fruit buds to replace those that have borne. Some of the *morellos* produce fruit on two-year-old wood, like the peach, the leaf buds being transformed into fruit buds during the second growth of the first season of their formation. The fruit bud is very easily distinguished from the leaf bud by its roundness and plumpness.

Pruning the Cherry as a Standard.—In Western New York the cherry succeeds so well, and being in general exempt from the bursting of the bark, that trees can be grown safely with trunks five or six feet high; but in the West, where this malady prevails, the less there be of a naked trunk the better; for it is the trunk and large branches that are generally so affected. As a standard, the cherry requires very little pruning.

To Form a Round Open Head.—We will take for example a young tree two years old, having three or four top branches. These at the time of planting should be cut back to within four or five buds of their base, and when growth has commenced, the requisite number of shoots, say four or five, to form the framework of the head, are selected, evenly distributed on all sides, and all the others pinched or rubbed off.

The following season these shoots may again be shortened to produce secondary branches to fill up spaces, and those arising from the centre should be pinched out, for the head must be kept open and accessible to the sun and light. In about three years of such treatment the head of the tree assumes a permanent form, and thereafter may be left to itself, except to remove occasionally branches that may cross or interfere with one another.

Pyramidal-headed Standards.—Certain varieties, for instance, *Sparhawk's Honey*, *Downer*, *China Bigarreau*, *Black Tartarian*, *Black Heart*, and some others, make fine pyramidal-shaped heads without pruning, more than to give the leader its due superiority at the beginning, and to remove afterwards, crossing and superfluous branches.

Such varieties as the *Yellow Spanish*, *Black Eagle*, *Knight's Early Black*, *Elton*, and all the spreading sorts, should have round, open heads, built upon three or four main branches, as described.

Pruning the Cherry as a Pyramid.—The same process recommended for the pyramidal training of the pear and apple may be applied with complete success to the cherry. We have now in our specimen grounds a collection of all the classes trained according to the method described, and their condition is in every respect satisfactory; they have all given fruit the third year.

In most cases the trees were taken from the nursery rows at the end of their first season's growth from the

bud. Some had no side branches, and others had. It is very common for cherries, and especially the Dukes and Morellos, to form a number of lateral branches the first season. Growth becomes slightly suspended, or at least goes on very slowly, in July; during this time the buds on the lower part acquire a sort of maturity, and when a new growth commences they push and form shoots. Cherry trees of this kind are in a good condition for pyramids. We select from these the strongest and best situated to form the lower tier of permanent branches; the lower ones are shortened to four or five buds, and the upper ones to two or three. The leader or stem is cut back to within six, eight, or ten buds of the branches. Those having no branches are cut back to within six or eight buds of the stock. And this is the first pruning.

Treatment during the First Summer after Pruning.—When the young shoots have grown a couple of inches in length, such as are intended for permanent branches are chosen, and the others are pinched in the same manner as recommended for pears and apples. Such as acquire more vigor than is consistent with their position, must be checked. It frequently happens that unless the leader has been cut back close, only three or four shoots will be produced at the extremity, leaving a vacant space below. This can be remedied in most cases by pinching the shoots around the leader when they have grown about an inch. In some cases it may be necessary even to check the leader to force the lower buds into growth. This is a point of considerable importance in conducting a pyramid, and should never be lost sight of.

The Cherry as an Espalier.—Except it be the training of the morello, or some other late varieties, on a north wall, to prolong their season of maturity, the cherry is seldom grown as an espalier tree in this country, nor is it to be recommended, except in some rare instances. The simplest and probably the best form is that suggested for

pears and apples, an upright stem with horizontal branches. To produce this the same means are employed as have been previously described. If the tree has no side branches proper for the first arms, it must be cut back to within six inches of the ground, and from the shoots produced below that, one is selected for the leader, and one on each side for the first horizontal branches; the other shoots are pinched off. At the next pruning the leader is again shortened to produce another pair of side branches eight or ten inches from the first; the leader is continued in an upright direction, and the side branches are brought half-way down in midsummer, and at the following spring pruning they are placed in the horizontal position. The leading shoot of rapid-growing sorts may be stopped about the end of June, and this will produce side shoots from which another pair of arms may be taken, and thus gain a year in the formation of the tree, or covering the wall or trellis.

For weak-growing sorts, the fan form or some modification of it would, perhaps, be more suitable than the horizontal, as it offers less restraint to the circulation of the sap in the branches.

The Cherry as a Dwarf or Bush.—The slow-growing sorts, such as the *dukes* and *morellos*, when worked on the mahaleb stock, make very pretty and very easily managed prolific bushes, and by occasional root-pruning they may be confined to as small a space as a dwarf apple-tree. To produce this form the young tree is cut back to within five or six buds of its base; and from the shoots produced below that, four or five evenly distributed around the tree are selected for the permanent branches or framework of the tree. The others are rubbed off. At the next pruning the branches thus produced are shortened to produce secondary branches; and thus it is treated from year to year until the tree is formed and full-grown.

The branches must be kept far enough apart to admit

the sun and air freely amongst them. When the tree is five or six years old, if it grows too vigorously, requiring more space than can be given it, the larger roots may be shortened in July or August, or in the winter. This and the pyramid, and the dwarf standard, with stems two feet high, are the most eligible garden forms for the cherry.*

This dwarf or bush form is probably the most advantageous one in which the cherry can be successfully grown in all of the Western and North-western States. Where the summers are hot and the air often very dry, the foliage protects the main stems; and where snows are deep, the tree is in this form often protected from cold and the fruit buds saved.

The *dwarf standard* is treated precisely as the dwarf, and differs from it only in having two feet instead of six or eight inches of stem. In pruning and training the cherry, it should always be borne in mind that when large branches are removed, it is liable to suffer from the gum, and therefore the regulation of the shoots should be carefully attended to in summer, that amputations of woody parts may be avoided as far as possible. When it is necessary, however, the cut surface heals more rapidly and surely when made in the summer, during the growing season.

SECTION 4.—PRUNING AND MANAGEMENT OF THE PEACH.

The peach is universally regarded as the most delicious fruit of our climate, and ranks in importance for orchard culture, next to the apple and the pear. Nowhere in the world is it produced in such quantities, and with so little

* Mr. Rivers states in his "Miniature Fruit Garden" that he has a plant of the late Duke Cherry ten years old that never was root-pruned, and yet is a small prolific tree, five feet in height, and the branches the same in diameter. We have in our specimen grounds trees of several dukes and morellos, six years old, on mahaleb stocks, not over four or five feet high, and pictures of fruitfulness.

labor, as in America. An English or French gardener will expend more labor on a single tree than the majority of our orchardists do upon one hundred. Our favorable climate obviates a multitude of difficulties that have to be contended with in other countries, and renders unnecessary the minute and laborious systems of management which they find it absolutely necessary to pursue.

But this very excellence of our climate has given rise to a most negligent and defective system of cultivation, as is everywhere illustrated in the condition of orchards. The peach, of all other trees, is one that, from its mode of growth and bearing, requires constant pruning to maintain it in a shapely, thrifty, and productive state. The sap tends powerfully to the extremities of the shoots, more so than in any other fruit tree. The buds that do not push and form shoots the first season after their formation, are lost; they cannot, as in most other trees, be excited into growth; and hence it is that the lower parts become so rapidly denuded of young wood, and that trees left to themselves six or seven years are in a measure worn out and useless.

The fruit is borne only on wood of the preceding year (see fruit branches), and every part destitute of such wood must be worthless; consequently one of the great objects of pruning is to keep all parts of the tree furnished with a regular and constant succession of annual bearing shoots.

The case of a single shoot will illustrate the influence of pruning and its necessity. By referring to the fruit branch, it will be seen that it is furnished with a certain number of wood buds and fruit buds. At the base there are always one or two wood buds at least.

Now, if that shoot were not pruned, all the fruit buds on it would probably produce fruit—one, two, or three of the wood buds at the top would make new shoots; these would necessarily be very weak in consequence of the fruit below them. At the end of the season there

would be a long, vacant space, entirely destitute of a young shoot or a living bud. This is the way that the interior and lower parts of trees soon become degarnished.

But when that shoot is shortened, we will say one half, the sap is retained in its lower parts, one half of the fruit buds are removed, and the consequence is that large and fine fruits are obtained from those remaining; vigorous young shoots are produced from the lower buds to bear next year, and take the place of those which have already borne. In this way regular uniform crops of large and fine fruit are obtained, and a constant succession of young shoots is kept up.

To Form the Head of a Standard Peach Tree.—We will suppose it the intention to form a standard tree, with a trunk two feet in hight, and a round, open, and symmetrical head. We take a yearling tree and cut it back to within two feet and a half of the ground in the spring. Below this cut, a certain number of shoots will be produced, from which three will be selected to form the main branches or framework of the head. All the others are rubbed off when two or three inches long, or sooner. At the end of the season we have a tree with three branches.

The *second year* these three branches are cut back full one-half their length, and from each we take a shoot to continue the branch, and one to form a secondary branch. The other shoots produced below these are pinched or checked, to prevent them from interfering with the growth of the leading branches. In the fall of the year we have a tree with six leading branches, and some bearing shoots below on the older wood.

The *third year* each of these six branches is shortened one-half, in order to obtain more secondary branches, and some fruit branches on the lower parts. All young shoots on the old wood, whether fruit branches or not, should be cut back one-half, or as far as may be necessary, to cause

the wood buds at their base to push, and make shoots to bear next year.

The formation of the head goes on as described, for two or three years more, when it is complete; for peach trees, properly pruned, do not assume such wide-spreading forms as they do naturally.

The main branches and secondary branches should be at equal distances throughout, and far enough apart to give the bearing wood on their sides the full benefit of the sun and air.

An equality of vigor should also be preserved amongst them by summer pinching. It is not uncommon to see a very vigorous shoot start up in a peach-tree, and appropriate so much of the sap as to injure a whole branch; these should be checked the moment their character is observed, unless they may be wanted to fill a vacancy. Every part of the branch should be furnished with bearing shoots, and these should, every spring, be shortened in one half or more, to produce others at their base, whilst those that have borne are cut out.

Some people imagine that when they have taken a pair of hedge shears, or some such instrument, and shorn off the ends of the shoots on the outside of the tree indiscriminately, they are "shortening in," and so they are, as they would a hedge! Some of the shoots are cut away entirely, fruit-buds and all, whilst others remain untouched, and the tree becomes like a brush on the outside and naked within. This is almost as bad as the let-alone system. Every shoot should be cut separately. The most expeditious instrument for doing this is a pair of light hand pruning shears, such as the French *secateur* (see instruments). A person accustomed to its use can prune every shoot on a full-grown tree in an almost incredibly short space of time, as compared with that required with the knife. Extensive orchardists, looking to the cost, may be deterred from such a labor; preferring to let their

orchards die after bearing a few crops, and plant new ones to take their place. In the case of garden trees, or the family orchard, the case is different, and careful pruning will pay.

Root Pruning.—In gardens where the soil is rich, and trees very full of vigor, disposed to grow too much and bear too little, root pruning should be practised once in two or three years—the first lightly, removing only the ends of the large feeding roots. The safest time to do it is between the fall of the leaf and the opening of spring. Vegetation in the peach seldom becomes sufficiently inactive during the growing season, to enable the roots to be pruned with safety.

The Peach in the form of a Vase.—Among all the forms in which trees are conducted, this is, when well done, one of the most graceful.

It consists of a short stem, two to five feet, according to fancy, with a head composed of three or four main branches, and two or three times that number of secondary branches, all trained, by means of light stakes at first, and afterwards wire or wooden hoops, in the form of a vase or goblet. The branches are arranged in a circle, with bearing shoots filling up the spaces. No shoots are permitted either in the interior or in front, that is, projecting from the exterior surface of the goblet.

The most beautiful trees of this form are to be seen in the gardens of the Luxembourg, at Paris, and elsewhere in France.

Mr. Louis Gaudry, who has a very pretty little plantation in Paris, and who has published a small work on pruning and training trees, gives the annexed cut as a representation of one of his vase peach-trees of eight years' growth (fig. 122). The following is the substance of his mode of conducting them.

First Pruning.—The stem of the yearling tree is cut back to the point at which it is desired to commence the

head, to three buds, forming a triangle, and as nearly as possible of the same height. Three shoots are obtained



Fig. 122.—PEACH-TREE IN FORM OF A VASE.

from these three buds to form the first or main branches or framework of the vase. To favor the growth of these, all the shoots produced below them are rubbed off.

In order to give them the proper inclination, three small

stakes are inserted in the ground, to which the three branches are fastened; it is supposed that if these stakes be sunk as far from the base of the tree as the roots extend, and in an upright position, there will be a sufficient opening or space in the center. The branches should be thus brought out about August, so that the formation of new layers of wood subsequent to that time may fix them in their places. The side shoots, which are produced on the young branches, towards the latter part of the season, designated by the French *bourgeois anticipés*, are pinched to one or two leaves.

Second Pruning.—The spring following, the branches are loosed from the stakes, and shortened to within six or eight inches of their base, to a leaf bud on the outside or front of the branch, and with a bud below it, either on the right or left side. The front bud continues the main branch, and the side bud forms a secondary branch. The three branches are pruned in this way, taking care that the secondary branch on each is on the same side, so that two of them can not come in contact. To favor the growth of these new shoots, all those situated below them that acquire too much vigor, must be pinched at three or four leaves.

A wooden hoop may now be placed in the center, to which the branches are attached to keep them in their places. In this way the tree progresses; every year one or more secondary branches are produced, the main branches increase in length, and fruit shoots are produced on all the intervals of the branches on their two sides.

All shoots that push either inside or in front of the vase are pinched off, and pinching is practised at all times to maintain equal growth between the different parts, and to check any too great tendency of the sap to the extremities.

Third Pruning.—The fruit branches are pruned to three or four buds, to induce the lower wood buds to push and form new wood for the next season.

The main branches are cut back to ten or twelve inches above the previous pruning, to a bud on the front to continue the branch; the buds selected to produce another series of secondary branches must all be on the side *opposite* the previous ones. If the position of the buds renders this impossible, then they may all be chosen on the same side as the first.

The hoops this year will require to be larger in diameter than the preceding, in order to give increased width to the vase as it proceeds upwards. All the other operations are conducted in the same manner. The hoops inside are placed within six to eight inches of one another, and the circular branches within twelve to fifteen inches. As the tree advances in age, the growth may become too vigorous at the top; and in this case, the main branches, always the most vigorous, must be pruned short, and even pinched during summer, to turn the sap to the benefit of the weaker parts.

These are the main points in the management of these vases. It may be added, that the apple, pear, cherry, and indeed all other trees may be grown in this form, and by the same means, varying it only to suit different modes of growth and bearing, and degrees of vigor.

The Peach as an Espalier.—Espalier training will never be practiced in this country to any very great extent, and therefore it may be considered, in comparison with open-ground systems, unimportant. Yet there are some districts not so favorably situated as to be able to produce peaches, apricots, and nectarines, in the open ground. For these a proper system of espalier training is important, because in this form trees are easily protected from winter or spring frosts, and they ripen their fruits perfectly, where open ground or standard trees would not. We have a tree trained on the wall of one of our nursery buildings which never fails to yield a good crop of superb fruit, when trees in open ground, both in orchard and gar-

den, fail. The fruit is of superior quality, and ripens considerably earlier than that on trees in open ground. On the 8th of August last, 1871, we picked from it Hale's Early, nine inches in circumference.

The Peach as an Espalier trained on a wall or trellis.—There are a multitude of forms for espalier trees where training on walls or trellises is necessarily and extensively practiced, as in England and France. The great requisites in a wall tree are, *first*, to have all the wall covered; and, *second*, to have the different parts of the tree alike favorably placed, with reference to its growth. Next to these are simplicity and naturalness.

The most popular form in England is that called the *fan*

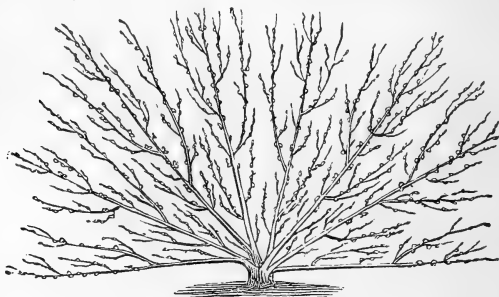


Fig. 123.—FAN-SHAPED ESPALIER.

(fig. 123). In it the branches are spread out so as to resemble a fan; the lower ones are nearly or quite horizontal; the next more oblique; and so they proceed until the center ones are quite upright, and this appears to be the defect of this form; for the horizontal branches can not maintain such a vigor as those more erect above them. The *square* espalier, invented by M. Felix Malo, of France, and now extensively practiced by some of the best peach-growers of the celebrated town of Montreuil, seems to possess more advantages, all in all, than any other. The *Ben Jardinier*, from which the following description of the method of conducting these trees is

taken, says: "This generally approved form begins to find imitators, and it is probable that one day it will be adopted by all intelligent gardeners."

First Year.—We will begin with a peach-tree one year from the bud, and cut it down to within six or eight inches, or three or four buds of the stock. From the buds produced below the cut, two of the strongest are chosen, one on each side to form the two main branches—*branches merely*; all the other shoots are destroyed, and these two are allowed to grow upright, and in the fall they will be three to four feet high.

Second Year (fig. 124).—In the spring, when hard frosts are no longer apprehended, the branches are examined to see if they be sound and healthy, free from bruises, insects, etc., and they are cut back to twelve or fifteen inches of their base, according to their strength; a weak branch ought always to be cut back in such a case as this further than a strong one.



Fig. 124.
SECOND YEAR.



Fig. 125.
THIRD YEAR.

The bud cut to, should, if possible, be on the *inside*, and the next bud below it on the *outside*; the first to continue the main branch, and the other to form the first exterior secondary branch. All shoots starting on the front or rear of the main branch should be rubbed off, and those on the sides laid in early to prevent their acquiring too much vigor. The main branches are left until July, when they are brought down to the form of a V, and attached to the wall or trellis in this position. The exterior secondary branch is placed more obliquely, and the fruit branches are kept in a uniform and moderate growth by pinching and laying in. The most vigorous should always be laid in first, to check them, and favor the others.

Third Year (fig. 125).—After loosening the tree from

the trellis, the two main branches are cut back to sixteen or eighteen inches of the previous pruning, and the two lower or secondary branches to twelve or sixteen inches.

The fruit branches are shortened to within two or three buds of their base, and all are again fastened back in their places. When the young shoots have reached the length of three, four, or five inches, such as are badly placed on the front or rear of the branches, or in any place injurious to the symmetry of the tree, are removed. During the summer the different branches must be laid in from time to time, the most vigorous first. This year two more secondary branches must be obtained on each side, in the same manner as in the previous year. Their growth is also promoted by the same means.

The fruit branches on the sides of the main branches may give some fruit this year, and those on the secondary branches may bear next year.

The fruit branches that have borne are to be cut away each year and replaced by others, therefore we must commence to provide for these, branches of replacement. They are produced as follows :

First, it may be observed that fruit branches have generally one or more wood buds at their base. Sometimes these will push and form branches of replacement without any assistance, more than cutting back. In such a case there is no difficulty. When the fruit is ripe, or at the next pruning, the fruit branch that has borne is cut away, and the new one takes its place. But nature does not always act thus. It is generally necessary to force the development of these branches of replacement, without which the branches in all their lower parts would become entirely denuded.

Hence, then, when a branch of replacement fails to appear by the ordinary method of shortening, we have two modes of forcing it: one is to make, after the fruit is set, an incision through the bark two inches above one of the

wood buds, and pinch close all the shoots on the fruit branch, leaving only rosettes of leaves necessary to the perfection of the fruit; pinching must be repeated all the time that the shoots on the fruit branch continue to grow.

Fourth Year (fig. 126).—After having examined if the tree is equally vigorous in all its parts, and having decided upon the means of restoring the balance if it has been lost, the tree is detached from the wall or trellis, and pruned, commencing with the fruit branches that have borne. These, it must be remembered, are to be cut back each year to the new branch of replacement produced at its base. The young shoot then becomes the fruit branch, and is pruned within four to fourteen inches, according to its vigor and the situation of the fruit buds.

The two main branches are cut back to within about twenty inches of the previous pruning; the first shoot on the inside is chosen to continue the branch, and the next one below it, on the lower and outer side, to produce the third exterior secondary branch. The two secondary branches already formed are cut back to about twelve to fifteen inches of the previous pruning, in order to make all the lateral buds on them push. The terminal bud produces a leader to continue them; all the others are fruit branches.

In attaching the tree again to the wall, the angle that exists between the two main branches is gradually widened, the branches a little more spread at every pruning.

Fifth Year (fig. 127).—The tree is now composed of two main branches, both of which have three secondary branches on their exterior lower sides, and fruit branches on all their length on the interior and upper side; and all that is wanted to complete it is to transform three of the



Fig. 126.
FOURTH YEAR.



Fig. 127.
FIFTH YEAR.

bearing shoots on the upper sides into three secondary branches, corresponding and alternating with the three lower ones. To do this we select the fruit branch on each, nearest the fork or base of the main branches. The growth of this is favored by training it in an upright position, and by pinching any vigorous shoots near it. The tree is managed thus, as in preceding years, in regard to laying in the shoots according to their vigor, and pinching to maintain regularity, etc.

The Sixth Year (fig. 128).—The pruning is conducted on the same principles precisely, and another interior secondary branch is produced in the same way as last year.

The Seventh Year (fig. 129).—Another is produced on each, and then the tree, with its two main branches and twelve secondary branches, all trained in the form of a parallelogram, is complete (fig. 130).

Fig. 131 represents the tree complete, bearing shoots and all.

The main branches should be permanently fixed at an



Fig. 128.
SIXTH YEAR.



Fig. 129.
SEVENTH YEAR.

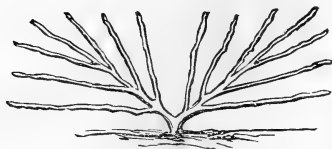


Fig. 130.—EIGHTH YEAR.

angle of 45° ; the lowest exterior secondary branches at 15° . Some cultivators recommend that the interior secondary branches converge to the center at an angle of 45° . This

gives them an oblique direction, and places them upon a more equal footing with the other parts.

In training such trees an imaginary circular line is produced on the wall or trellis, and this is divided off into parts, corresponding to the degrees of a circle, commencing at the center above, and numbering both ways to the base: this enables the persons who conduct the tree to lay in the branches on both sides at an equal angle with precision, which is quite requisite to maintain uniformity of growth and vigor. It has been considered necessary to treat this subject somewhat minutely, for the purpose of giving to persons wholly unacquainted with training, some knowledge of the principles on which it depends, and the mode of its execution.

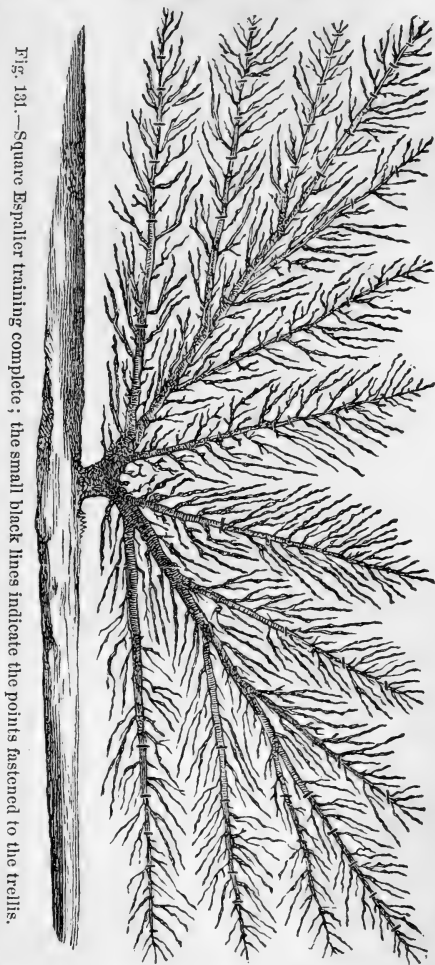


Fig. 131.—Square Espallier training complete; the small black lines indicate the points fastened to the trellis.

The form described above is one of the simplest of all espaliers, except the horizontal, described in treating of the apple and the pear; but whoever can train a tree in this manner well, can do it in all others, for the principles of growth are the same always; and he who understands these, can mould his trees at pleasure, provided he can bestow the necessary labor. The peach may be grown in any or all the espalier forms, and may thus be easily protected by means of straw-mats, or evergreen branches.

Laying in, and fastening the trees to walls and trellises.—When trees are trained to a wall or fence, the branches are fastened in the desired position by means of shreds of cloth list, or strips of India-rubber half an inch wide, and from two to three inches long, according to the size of the branch to be laid in. Very small nails are necessary to train on boards, but larger ones on a brick and stone wall. On a wire trellis, strings of bass matting are used instead of nails and cloth; and in fastening to simple rails, small willows may be used. The principle to be observed, in laying in and fastening the branches and shoots of espalier trees, is that *strong shoots must be laid in sooner than weak ones*, and also more inclined from the vertical direction. A great deal may be done towards maintaining uniformity of growth in the different parts of a trained tree, by laying in the branches in a judicious and discriminating manner.

SECTION 5.—PRUNING AND MANAGEMENT OF THE PLUM.

The plum bears its fruit on spurs produced on wood two years old and upwards, like the cherry (see Fruit Branches). On young trees these spurs are several years in the process of formation; but when they commence to bear they endure, if well managed, for many years. They are generally furnished with wood buds on their lower parts; and when they begin to grow feeble, they ought

to be renewed by cutting back. The plum is almost universally grown as a standard, and the head may be conducted in the same manner as described for the cherry. The branches should be mainly regulated by summer pinching, to obviate the necessity of knife-pruning, that frequently gives rise to the gum. Some varieties of very rapid growth produce shoots three or four feet long in one season; and if not shortened back at the spring pruning, the tree presents long naked branches in a short time.

Standards and dwarf standards may be root-pruned to advantage in small gardens, and where it is desirable to get them into early bearing.

The plum may be trained in any of the espalier forms already described, and in the same manner.

SECTION 6.—PRUNING AND MANAGEMENT OF THE APRICOT.

The Apricot, like the peach, has fruit and wood buds mixed on the shoots of one year's growth. It has also little fruit branches or spurs like the plum, which are capable of being renewed by shortening.

The mode of pruning must therefore have in view the production of young wood, and maintaining the spurs in a vigorous and fruitful state. When neglected, it becomes, like the peach, denuded of young bearing wood in the interior, and enfeebled by over-fruitfulness. The shoots should therefore be shortened every season, according to their length, as recommended for the peach, to reduce the number of blossom buds, and favor the production of new bearing wood.

It is very liable to the gum, and severe pruning with the knife should be obviated as far as possible by pinching. It may be conducted as a standard, pyramid, dwarf, or espalier, on the same principle as other trees. When trees become enfeebled by neglect or age, they can

be renewed by heading down close to the stem. New and vigorous shoots are immediately produced that form a new tree. This heading down should be done very early in the spring, and the wounds be carefully covered with grafting wax.

It is one of the first of our fruit trees to blossom in the spring, and therefore in some localities the flowers are killed by the frost. Where this is apprehended it may be well to plant on the north side of a wall, or something that will rather retard the period of blooming, and subject it less to freezing and thawing. We have apricots trained here on a south aspect, yet in seven years the blossoms have not been killed, though in one or two instances they have been slightly injured. The espalier trees offer great facility for protection; and therefore, where spring frosts prevail, the apricot should be so trained. Mats or straw hurdles can be placed against them, both in spring and winter if necessary, with the same ease that a common frame is covered. We have used evergreen boughs for this purpose with great success.

SECTION 7.—PRUNING THE NECTARINE.

The Nectarine is but a smooth-skinned peach. The trees are so similar in their mode of growth, buds, etc., that they can not be distinguished from one another, and, therefore, whatever has been said respecting the pruning and treatment of one, applies with equal force to the other. This fruit is so infested with the curculio, that it is almost impossible to obtain a crop that will pay for culture in any part of the country in the open ground. Unless some more effective remedy be discovered than any yet known, it will soon have to retire from the garden, and take up its residence with the foreign grape in glass-houses.

It produces excellent crops trained in espaliers on a back wall, or a center trellis of a cold-grapery.

SECTION 8.—HARDY NATIVE GRAPES.

Culture, Pruning, and Training.—When we wrote the first pages of THE FRUIT GARDEN, in 1851, the culture of our native hardy grape was principally confined to a few vines in the gardens of amateur horticulturists. Vineyard culture was supposed to be adapted only to high, hilly locations, and, beyond a few hundred acres in the neighborhood of Cincinnati, O., was all unknown and untried. The varieties at that time considered valuable for general cultivation were limited to a bare half-dozen. But the past twenty years have wrought wonderful changes, abounding in results of incalculable value. As we have said, at the time we first wrote, the list of valued varieties was but a bare half-dozen, and no attempts had then been made toward improvement by the production of new sorts from seed; but now our lists of varieties grown from seed have become numerous, greatly improved in quality of fruit, with habits as to ripening, growth, etc., adapted to all soils and locations. The culture of the vine has become, as it were, a feature belonging to every household and garden, while vineyards by the thousands of acres cover not only the hills but the broad prairies and other level lands of our States. The interest and extent of this branch of rural occupation have induced the application of thought and skill. So that while the past twenty years have wrought wonderful changes, the prospective advance in improvement of varieties and adaptation to soils and localities is an item beyond computation.

Varieties introduced since 1851.—In 1851 the varieties of hardy grapes known and described, numbered about twenty; now their number is about two hundred, many of them, however, of inferior quality, and others so nearly resembling their parents as not to make them specially valuable.

Acres in Cultivation.—In the absence of any reliable statistics no true account of the number of acres in cultivation can now be written, but estimating from the reports of Grape Growers', Horticultural, and Agricultural Societies, we may safely assume that we have something over one million of acres, of which the territory west of the Rocky Mountains may claim 100,000, and the States east the remainder.

Garden Culture.—The management of our native grapes is exceedingly simple. The vine appears to accommodate itself to a great variety of modes of treatment and give an abundance of fruit. But a well-pruned and trained vine, in a well-prepared soil, will assuredly compensate for all additional labor and care in its culture.

Immense crops are raised throughout the country in the entire absence of any systematic mode of training or pruning. A single vine in a neighbor's garden, carried to the flat roof of an out-building, and allowed to ramble there at pleasure, without any care but a very imperfect pruning every spring, produces annually many bushels of fruit; but the quality is, of course, greatly inferior to that produced on well-pruned, trained, and dressed vines. A grape-vine neatly trained on a trellis, with its luxuriant, ample foliage and rich, pendulous clusters of fruit, is really one of the most interesting objects in a fruit garden, and at the same time one of the most profitable; for the shade and ornament alone that it produces, are a sufficient recompense for its culture.

Soils.—In planting a grape-vine the first point is to prepare a border for the roots.

This must, in the first place, be perfectly dry. If the soil or situation be wet or damp, it must be drained thoroughly, so that no stagnant moisture can exist in it. In the next place, it must be deep; three feet is a good depth, and it must not be less than two, where abundant and fine crops are expected. The mode of preparation is, to dig

out the natural soil to the required depth, and the length and width necessary. For a single vine the border should be eight or ten feet long and four wide.

When the excavation is made, if the soil be stiff or damp, a few inches, or a foot deep, of small stones, brick, rubbish, etc., may be laid on the bottom as a sort of drainage. On the top of this, deposit the compost for the border. This may consist of two parts of good, fresh, friable loam, one of old, well-rotted manure, and one of ashes, shells, broken bones, etc., all completely mixed with one another. The top of the border, when finished, should be at least a foot higher than the surface of the ground, so that it may still remain higher after settling.

Position of the Vine or Border.—A southern exposure is generally considered best, because there the vine is supposed to get the rays of the sun during the entire day; but an eastern exposure, with sun three-fourths of the day, is often quite as successful, and especially so with the early-ripening varieties. A western is next best, while a northern exposure, with the sun's rays only one-half the day, should be avoided if possible, but if used the hardy early-ripening varieties only should be planted.

Planting the Vine.—As in planting any other tree, the roots should be carefully spread out, and the fine earth worked well in amongst them. Its position should be exactly in the centre of the trellis it is to be trained on.

The depth to which the roots are covered should never be less than four inches over the upper or crown line, and if the position is a southern one and the soil naturally dry, six to eight inches will be better.

Distance Apart.—This must be regulated somewhat by the variety of vine planted; the Concord, Ives', or other strong-growing sorts, requiring nearly double the room of the equally healthy and vigorous but short-jointed varieties, like the Delaware, Rebecca, etc.

The Trellis.—Having the border thus prepared, the next

point is the *trellis*. The form of this will depend on the situation it is to occupy, and the mode of training to be adopted. Fig. 132 represents one intended for a wall. The principal bars or frame-work are inch-and-a-half boards, three inches wide, nailed together at the angles.

It is intended for one vine, and may be the height of the wall that it is intended to occupy. The vertical or upright bars are three feet apart and the cross ones six feet; between them are rods of stout wire. The first or lowest cross-bar may be two feet from the ground. It is

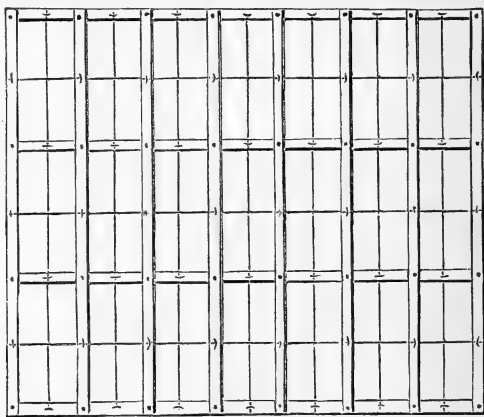


Fig. 132.—TRELLIS FOR A SINGLE VINE.

fastened to the wall by iron hooks or brackets. The best and simplest mode of training a vine on such a trellis as this, is to produce two main branches or arms to be trained in a horizontal manner on the first cross-bar. From these two arms, permanent upright canes are trained, one to each of the upright bars of the trellis. These upright canes produce on their sides a succession of bearing shoots from year to year, being pruned after what is called the "spur" system.

The trellis may also be made entirely of wires, using strong half-inch rods for the main uprights and cross-bars,

then No. 14 wire for intermediates, and these arranged to slide along the main rods to meet the requirements of the vine during its growth. The main rods are secured to the wall by cylinder hook-staples. A neat and durable trellis for vines in the open garden along the border (see fig. 133) may be made by setting firm wooden posts, well braced, at each end of the line, then stretch one half-inch rod at say eighteen inches from the ground and another at the top of the posts, then use No. 9 wire for the remaining horizontal lines, and at distances of twelve feet along the line sustain the horizontal rods and wires by upright bars of iron one inch wide by one-quarter inch thick, the lower end of each upright let into a stone in

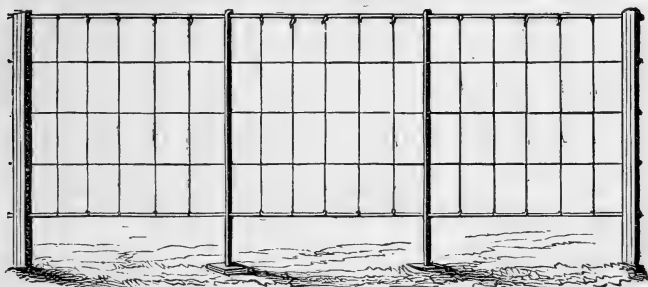


Fig. 133.—TRELLIS OF WIRES AND POSTS.

the ground. Now place upright wires, secured at the top and bottom, so that they will slide to meet the wants of the shoots of the vine. This wire may be of No. 14 or 16. It is not absolutely essential that the trellis be built until the vines have grown one season; but if the vines do well, the cost of supplying temporary stakes, etc., will more than balance the interest on the cost of the trellis.

With the vine planted and trellis built we have next to understand

Pruning.—It must first be observed that the grape-vine bears its fruit on shoots of the current year, produced

from eyes on the previous year's wood. Fig. 134 represents the old wood, with its bearing shoot. It is important to understand this, because it shows the necessity of keeping up a supply of young wood wherever we desire fruit to be produced.

It is immaterial what method of training be pursued, this principle of production must always be remembered.

To illustrate the pruning, we will suppose the plant to be one or two years old, as ordinarily sent out from the nursery. It may have only one shoot, or it may have several. However this may be, all are pruned off but the



Fig. 134.—FRUITING BRANCH OF THE GRAPE.

The cross-line near the end shows where it ought to be stopped.

strongest, and it is cut back to within two eyes of its base. These two eyes will produce shoots, and when they have made a growth of two or three inches, the weaker one is rubbed off and the strong one trained up. It is allowed to grow on until September, when the end of the shoot is pinched to mature and strengthen it. Any side shoots that appear during the summer should be pinched off, as well as any suckers that may appear about the roots.

Fig. 135 shows the condition of the plant or vine at the close of the first season's growth, and the cross-mark the line at which to cut in pruning for the

Second Year.—If the shoot of last year made a strong growth of ten or twelve feet, it may be now cut back to three eyes, and two canes be trained up; but if it made

only a weak growth, it should again be cut back to two eyes, and one shoot only trained up.

Side shoots, laterals, or "thallons," as they are sometimes called, should be carefully watched, and as soon as a leaf has formed one inch in diameter the shoot should be pinched off just beyond it, with thumb and finger. In a short time this leaf will have become of full size, and the bud at its base have matured and again pushed forth a new shoot, which should be stopped as at first. This sometimes occurs two, three, or more times in a season. No suckers from below the main canes should be permitted to grow. In September these canes are to be stopped as before, and no fruit allowed.

Third Year.—We have now two strong canes with which we commence the framework of the vine. Each of these is cut back at the winter pruning to within two or three *feet*, not *buds*, of its base, bent in the form of a bow, and tied to the lower wire of the trellis. After the buds have started in the spring, and made a growth of four to six inches, these canes should be loosened and laid in, as in fig. 136, and fastened to the lower horizontal bar of the trellis. The bud on the end of each at *c*, will produce a shoot to continue the prolongment in a horizontal



Fig. 135.—VINE AT THE END OF THE FIRST YEAR.

direction, and a bud (*a*) on the upper side of each will produce a shoot to be trained to one of the upright bars—the first one on its division, or half of

its trellis; all others are rubbed off, or the buds cut out. Thus each of these arms produces two shoots—an upright and a horizontal one. During the summer, these

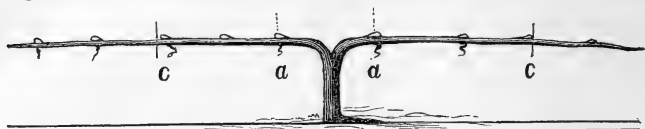


Fig. 136.—VINE WITH ITS ARMS LAID DOWN.

The arms to be shortened at *c*, the bud *a* to be allowed to produce a shoot.

shoots are carefully tied in as required, the side shoots pinched off from time to time, and all suckers rubbed out as they appear. They are also stopped in September, as before.

Fourth Year.—Each of last year's shoots is cut back to within three feet of its base. It may be necessary to cut the horizontal ones closer than the upright ones, to obtain another strong upright shoot. The two upright

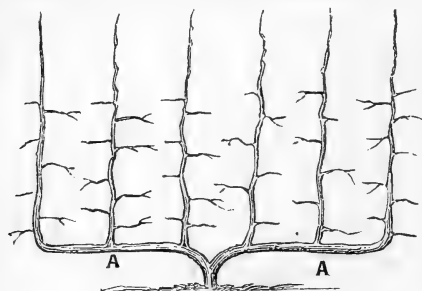


Fig. 137.

Vine with horizontal arms, *A, A*, and upright permanent canes, spur-pruned.

canes already established will produce a shoot from their tops, to continue their extension upwards, and the horizontal ones, as before, produce a shoot at the point to be carried outwards, and one on the top to be trained up to one of

the upright bars. This year several fruit shoots will be produced, on each of which one or two bunches of grapes may be ripened. In this way the vine goes on adding every season two new upright canes, and two or three feet in length to the previous ones, until the whole trellis is covered; when the management will consist in

pruning the spurs every winter to about three eyes. Each fruit branch should only be allowed to produce two bunches of fruit, and when the shoot has made four to six leaves beyond the last bunch of fruit the end should be pinched. This will, of course, cause the full development of the foliage, and in a short time the last bud will push out a side shoot or lateral, which must again and again be pinched as it grows. The object of this is to arrest the production of useless wood and turn the sap to the benefit of the fruit. Fig. 137 represents the appearance of a vine trained in this way.

By such a system as this the trellis is covered in every part with bearing wood, the fruit and the foliage are all exposed fully to the sun, a uniformity of vigor is maintained between the different parts, and the appearance is beautiful.

There are many other forms of training, each of which has its merits and its advocates, but it should always be remembered that the tendency of sap in all vegetation is toward the extreme shoot, or end, and any system of training that assists that will soon render weak and barren the buds nearest the crown. The Thomery system, so called from its being practised in a little village of that name in France, is one of the neatest and most systematic, as well as effective when thoroughly practised, but it requires considerable skill and much labor. It is, in brief, to form the trellis as we would for any other mode, only making it higher, the placing the vines at equal distances, and training the first and third with arms to the lower wire; the second and fourth have the main stem carried up to the second wire, where the arms are formed.

In fruiting, canes are grown annually from spurs along these arms, and tied as they grow to the upright wires on the trellis. It is estimated that to keep a vine in good bearing condition, it should not cover, at any time, over six to eight feet of one wire of the trellis, and, as before

stated, if the trellis is required to be high, it may be so done by first training the main stem of the vine to the height of trellis wire upon which it is to be grown.

Another mode, termed the Guyot system, consists in growing two canes upon the vine the second year, one of which is cut back to two buds, and the other to two or three feet, and tied down to the lower wire (see fig. 138). Upon this lower or horizontal cane, the fruit is grown, and the shoots, as they extend, are tied to the next wire above. The two canes from the spur are grown to about five feet, when they are stopped in, and all the season the pinching of the side shoots, or laterals, is continued, and

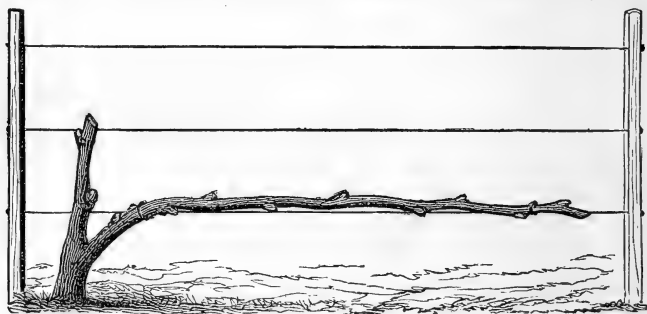


Fig. 138.—VINE TRAINED ON THE GUYOT SYSTEM.

all suckers rubbed away. This system is modified or changed in the hands of some growers, by not fruiting the horizontal cane the first year it is laid in, but pinching off all fruit, and carrying upright canes, to be stopped at the second or third wire, according to strength of vine, and on them to make the fruit the following year. This is again changed by some growers spurring back each alternate cane springing from the horizontal one, and so fruiting alternately. Others, again, cut back these upright canes from the arm in proportion as they extend from the main vine. The upright cane nearest the main vine is thus left, say two feet, and the next from it fourteen inches, and

so reducing that the end of the arm has only a bud from which to grow a new cane (see fig. 139). This is supposed to assist in more equally distributing the flow of sap. The upright canes from the main vine are yearly cut back and renewed for use as arms when wanted.

In cases where the modes of training above described

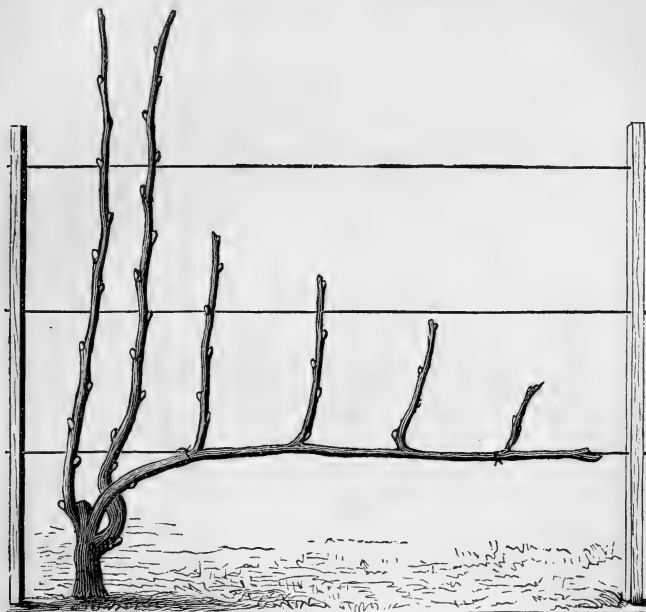


Fig. 139.—VINE ON THE GUYOT SYSTEM.

cannot be conveniently adopted, two or three poles, twelve to fifteen feet high, may be sunk in the ground, with a space of three or four feet between them at the bottom, and fastened together at the top, forming a cone around which the permanent canes may be trained in a spiral manner.

This produces a very beautiful effect, and occupies comparatively little space, but the grapes will not all ripen so

well, nor will the training be so easy as on the flat surface of a trellis.

Another way of arranging the poles is with the tops outwardly, and securing them at distances by hoops. This mode gives light and air to the vine, but requires good stout poles, well set in the ground, to support it against strong winds.

Very tasteful arbors may also be made over some of the walks, by training the vine over the wood-work, or wire frame, in the same manner as on a trellis.

This is a very common practice and offers many advantages. Ingenious persons who care well for their garden, as well in its appearance as its productions, will conceive other plans still better adapted to their particular wants and taste than any of these; but the main point must always be kept in view, that is, to provide for the foliage a free, open exposure to the sun. Any system that does not secure this, will fail to a greater or less extent.

In the management of a grape-vine, as in the management of other trees, summer pruning, *i. e.*, pinching the ends of shoots, not cutting away of foliage, is of great consequence. If a vine is left to itself all summer, or from one winter pruning to another, it will be found that a vast quantity of useless wood has been produced, and that to the serious detriment of the bearing shoots for the following year. The growing vine should be frequently visited, shoots tied in, strong ones checked, superfluous ones rubbed off, and every part kept in its proper place, and in a proper degree of vigor.

VINEYARD CULTURE.

A quarter of a century since, taking our knowledge of position, soils, etc., from the vineyards of Europe, we supposed that hill-sides, or warm, sheltered positions only, were suited to the culture of the grape, but thanks to the

energy and spirit of trial which pervades the people of this country, we have now such a variety, and so suited to soils, climates, and localities, that the culture of the grape may be said to be adapted, in the way of profitable culture, to nearly every variety of soil, climate, or location.

The quantity of grapes produced as an item of profit per acre, depends much upon soils, location, nearness to market, and variety grown. The statements of growers vary greatly in the amount, all the way from one and a half tons to five and six tons per acre, and the gross receipts are given all the way from three hundred to eight hundred dollars.

Such varieties as the Concord, Isabella, etc., it may be safely estimated, will produce one year with another from two to three tons, and the Delaware, Miles, etc., from one and a half to two tons per acre. Seasons, insects, and diseases, care and culture will, of course, vary results, and while the grower may one season obtain four tons to the acre, the same vines another year may not produce over one ton of fine, marketable fruit.

It should, however, be remembered that while certain varieties of the grape can be grown in varied soils and locations, there is a requisite to be obtained for the production of the richest grapes and the best vines; that requisite being in the sugar contained in the fruit, and only to be had in the grape when planted in soil and location *exactly* suited to its best development.

The grower who seeks only for a table market, has first to select the variety to meet his soil and location, and then to grow large berries and bunches, well colored, and just sufficiently matured to make them vinously sweet. The grower for wine purposes must have another view—for his crop value depends upon the full maturation of the sugar in his grapes.

Soils and Situation.—Although we have said such is the variety of grapes now cultivated that some one may

be selected for nearly every soil and location, yet we do not thereby desire to convey the idea that all soils and locations are equally adapted to the grape. Our experience and observation have taught us that it is only upon a comparatively few locations and soils that the best grapes are produced. A high elevation, sloping to the east and south, or, if a large lake or body of water lie on the north, then a gentle slope to the south, as along the south shore of Lake Erie, with a soil of clay underlaid with broken shale rock, is, perhaps, the best of all soils and locations. The next to this is a rolling and moderately elevated position, adjacent to some large body of water, a stiff clay, with an underlay of shale rock; next, is the same location with a clay soil resting on a gravel bed. The next is a good, rich, clayey loam, resting upon a shale or gravel bed, and lying nearly level; and the last we would use for the grape, in any case, is a light, sandy loam, resting either upon a compact yellow sand or a gravel. This last will produce fine, handsome bunches, of many varieties, but the durability of vines in such localities is doubtful.

Shelter.—Shelter is not indispensable to all vineyards, but many localities exposed to violent winds may be benefited materially by the planting of groups or masses of trees, at proper distances, on the side from whence come the strongest winds. Evergreens ameliorate the temperature of the winds better than deciduous trees, but, in absence of them, the planting of Beech, Maple, etc., will assist in checking the liability to sudden changes, and protect the vines and fruit from the effects of the high wind, which, as we now write, October, 1871, has done much damage to our own vineyard.

Preparation of the Soil.—The first preparation of the soil is an important item in the forming of a vineyard. The vigor and healthiness of the first and second years' growth of the vine often decide their future. No young

plants, with small fibrous roots, can be made to grow rapidly unless the soil be fine and rich. This applies to the grape-vine; hence the necessity of making the soil for the planting of the vineyard deep and rich at the outset. If the land is level so that it can be plowed, then plow it as deep as possible with the common plow, and follow in the furrow with a subsoil plow, thus loosening the ground to a depth of not less than sixteen to twenty inches, the deeper the better. Hill-sides not too steep may be prepared by using a side-hill plow, and in plowing leaving a strip of three or four feet unplowed at distances of from eight to twenty feet, for the purpose of preventing washing. Very steep hill-sides must be dug with the pick and spade. If the ground is not what is called in good heart, but has been cropped yearly without manure, it should be dressed with a coat of ashes, bone-dust, or well-rotted barn-yard manure, and worked in with the harrow or cultivator.

Time to Plant.—Where the soil is well drained, or of a light sandy or loamy character, and the climate not too severe, we should prefer to plant in the fall. In such case we should cover the entire plant with an inch or so of soil, to be removed as soon as the frost will permit, in the spring. The advantages of planting in the fall are, that as a rule the ground works better, and the work is therefore better done; add to this that the earth becomes well settled among the roots and often new fibres will be thrown out, ready for growth in spring. But we have planted at all periods, when the ground would work, from October to June, and, if our plants were in good condition, have been successful.

Kind of Plants.—Vines one or two years old, with well-ripened tops and roots, the latter one quarter of an inch in diameter, are perhaps the best, whether grown from single or triple-eyed cuttings, or by layers.

Distance to Plant.—The distance apart at which to

plant must depend upon the soil, variety, and mode of training, separately and collectively. Nearly all varieties have a tendency to make more wood in light, sandy, gravelly, or loamy soils, than on clays. Strong, rampant-growing sorts, as the Concord, Ives', Norton's Virginia, Clinton, etc., on loamy or rich soils, should have at least ten or twelve feet space on the row, and the rows eight feet apart. If the ground is of a heavy clay, then the distance on the rows may be reduced two feet. For varieties like Catawba, Iona, etc., eight feet apart each way is about right. Delaware, Walter, and other short-jointed varieties may be planted at six feet in the rows, the rows eight feet. The above, if the training is to be upon trellis, in any of the renewal modes. If the training is to be on stakes, in the serpentine or bow system, then the distance may be reduced one foot each way. For very long pruning and training on trellis, the distance must be increased, some cultivators planting at twelve feet, with the vines eighteen feet apart in the row.

Depth to Plant.—In heavy soils the upper tier of roots should always have at least four to five inches of earth over them, and in light or dry soils six to eight inches.

Pruning—when and how.—For the annual or winter pruning the best time is as soon as the wood is ripened in the fall, but the work may be done any time until the warmth of spring starts a rapid circulation of sap. Never cut close to a bud, but leave an inch or two of wood beyond. For summer pruning, see Garden Culture, page 276, and for the length of wood left at the winter pruning, refer to the method of training that it is proposed to practise.

Modes of Training.—Under the head of Garden Culture, we have described several modes of training that are sometimes practised in the vineyard, to which the reader is referred. In Ohio and Missouri, the mode generally practised is called the renewal-cane system, and con-

sists in yearly cutting away all the wood of two years old or more. The vine is taken, say at the close of the second summer, with, as supposed, three good strong canes grown from a point near the ground; two of these canes are cut back to from four to six feet, according to the strength of the vine, and are tied to the lower wire in a bowed shape (see fig. 140), while the third cane is cut back to three or five buds, according to the age and vigor of the vine. The long bent canes are for fruiting, while on the shoots that grow from the centre cane all the fruit is rubbed off. The next season the bearing canes

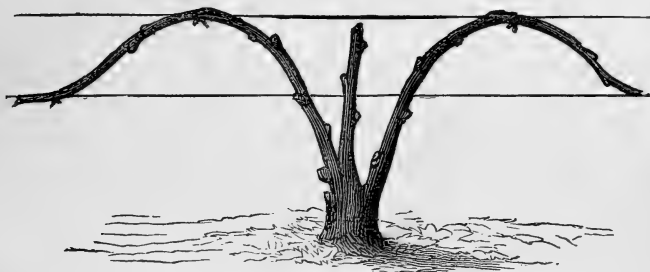


Fig. 140.—BOW TRAINING.

are cut away, two or three new canes are laid in for fruit, the centre cane cut back as before, for new shoots, and so from year to year the practice repeated. Some *vignerons* practise training and fruiting by leaving very long canes, with more or less of the laterals, these latter being pruned to one or two buds, from which, it is claimed, some of the best fruit is grown. Such varieties as the Clinton, Norton's Virginia, Concord, etc., are by some considered best when grown in this way.

Training upon stakes is a practice esteemed by many as giving better circulation of air among the vines. Some use two stakes, on one of which two canes of the previ-

ous year's growth are tied spirally (see fig. 141), and on the other the new shoots are conducted as they grow, and tied so as not to be removed. In the winter pruning these canes are shortened, and those that bore last year are cut down for the production of new canes.

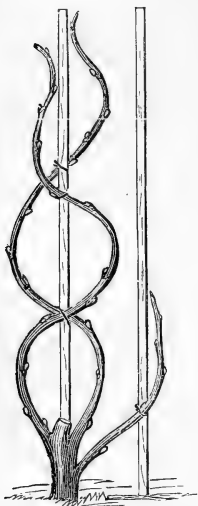


Fig. 141.—SPIRAL TRAINING.

Another practice is to use three stakes, on the centre one of which the new shoots are grown, and on the two outside ones a cane is trained for fruiting. Another system of training on stakes is to cut back the vine to three or four eyes for fruiting, and two or so for new canes; the whole, then, as they grow, are trained to the one stake. This practice answers for some weak growers, or for those with sparse foliage, but is not advisable with strong-growing, vigorous sorts.

For more complete details of modes of grape-growing and pruning, we refer to the various valuable books devoted exclusively to the subject.

CULTURE OF FOREIGN GRAPES IN COLD VINERIES.

Repeated experiments made during many years in all parts of the country, have convinced people generally that the delicious varieties of the foreign grape cannot be produced with any considerable degree of success in the open air. A large number of the hardiest French and German sorts have been tested in our ground, but not one of them has borne satisfactorily. A few good bunches have been obtained the first season or two under very favorable cir-

cumstances; but after that the failure is complete. This has rendered glass, heat, and shelter necessary.

The Buildings.—These are constructed of all sizes and at various degrees of expense. Some have single lean-to roofs; others have double or span roofs. The walls of some are built of brick or stone; others are wholly of wood. The cheapest and simplest structure of this kind is the lean-to. The back may be nine or ten feet high, composed of strong cedar posts six feet apart, and boarded up on both sides. The ends are made in the same manner. The front may be two or three feet high, made of posts, and boards or planks, same as the back. Sills or plates are put on the front and back walls, and then rafters at three and a half to four feet apart. The sashes slip in between the rafters, and rest on a strip of wood on their sides. Unless the grapery be very small, the sash should be in two parts, the lower one twice as long as the upper, and fixed; the upper to slide down over the under one on pulleys, to ventilate the house. Doors are in each end at the back, and means are provided for admitting air in front by the opening of boards like shutters.

But a cheap structure is not the best economy, and while such may be admissible, on a merely commercial place, it would be out of character in any neatly kept grounds. The maxim, that "whatever is worth doing is worth doing well," holds good in the construction of a grapery, and therefore, however plain the architecture of the design, the materials should be of the best, the arrangement convenient, and the putting together done in a workman-like manner.

Lean-to or single-roof houses may frequently be built against the south or east side of a wall or out-building, and thus can be constructed cheaply, but a span-roofed house is much the best.

Fig. 142 gives a good representation of a single-roof

house against a wall, and fig. 143 represents a span curvilinear - roofed house, 20 x 30

feet, which we have built upon our own grounds and found very successful.

Fig. 144 is a representation of a straight - roof house, for cold grapery, taken from Woodward's Graperies.

Position of House.—A south or south - east fronting is the best for a lean-to house, and for span roofs a north and south line affords the most equal amount of sunlight.

The border is made for the vines outside the front wall, or part outside and part in, twelve to sixteen feet wide, also two or three deep. This is

done by digging a trench or pit the length and width;

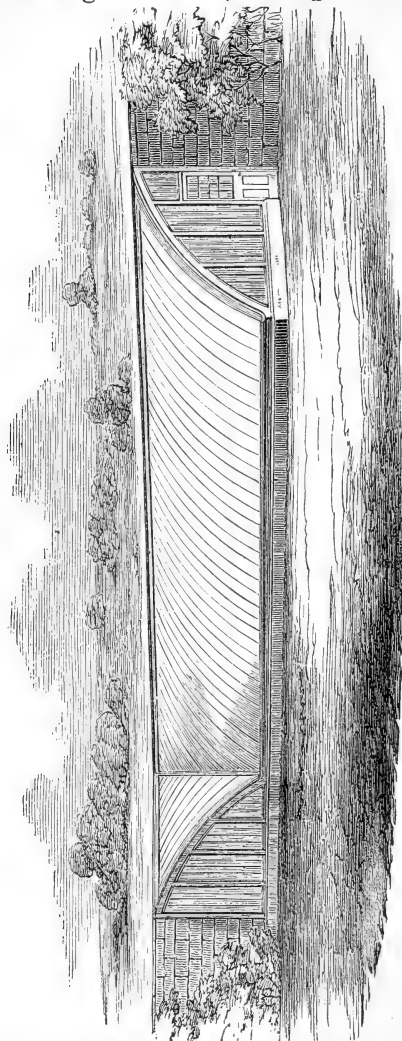


Fig. 142.—SINGLE-ROOF HOUSE AGAINST A WALL (From Woodward's Graperies).

draining it thoroughly, that not a drop of water can lodge about it. Then lay a few inches of small stones, broken bricks, shells, etc., in the bottom for drainage; and fill up the remainder, six inches to two feet above the level of the ground, and sloping outwards, with a good compost, of three-fourths surface loam (turf from an old pasture), and the other of well-rotted stable manure. All these must be prepared by frequent turning and mixing a few months beforehand.

The vines may be one or two years old, and are prefer-

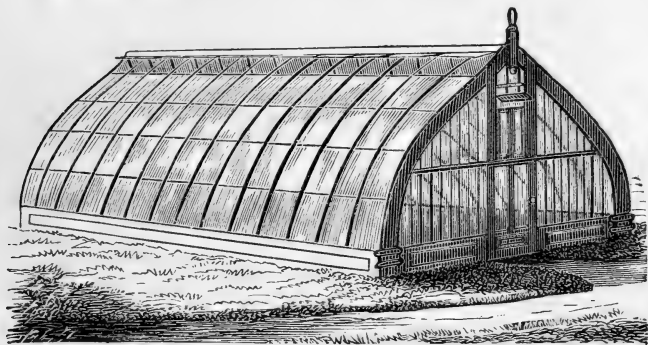


Fig. 143.—SPAN CURVILINEAR-ROOFED HOUSE.

able raised in pots from single eyes. They should be planted in the spring. A plant is placed under each rafter outside, or inside, and carried through under the wall into the house. The stem is cut back to two or three eyes, and when these break the strongest shoot is selected, and the others pinched off. This shoot is trained, as it grows, to a light trellis of iron, or thick wire rods attached to the rafter, and twelve to fifteen inches from the glass. If all goes well, it reaches the top of the house that season. In September the top may be pinched to check the flow of sap, and throw it more into the lateral buds to increase their strength. During the summer no other shoot is allowed to grow but this.

Pruning.—In November or December it is taken down, pruned, if according to the spur system, which is the

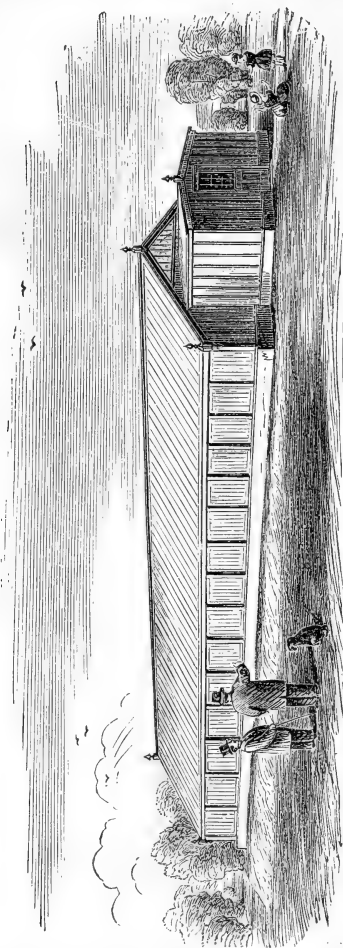


Fig. 144.—STRAIGHT-ROOF COLD-GRAPERY (*From Woodward's Graperies*).

simplest, to within three or four feet of its base, laid on the ground, and covered with leaves, evergreen boughs, or mats. There it remains till the buds begin to swell in the spring, when it is again fastened to the trellis. The shoot from the terminal bud continues the cane, and no fruit is allowed on it. Those below it produce lateral shoots, from each of which a bunch of grapes may be taken, and each of these must be stopped at three eyes above the bunch; and this is repeated as often as necessary, to give the fruit the whole benefit of the sap. The leading shoot is again stopped in September by pinching off its point, to increase the vigor of its lateral buds. In the fall,

when the leaves have dropped, the vine is again taken down. The leader is pruned back to within three to

four feet of the old wood. The laterals that have borne are pruned to three eyes, and it is then covered up. This is the routine of spur training. In *long cane* pruning, the young shoot, after the first season's growth, is cut back to three eyes, and the next season two shoots are trained up. The next season the strongest is selected for fruit, and pruned to about three feet; each of the eyes left will produce a fruit shoot, from which one bunch only will be taken. The weaker cane is cut back to one eye, and this produces a shoot for next year's bearing, and so this goes on. When the vine becomes strong, several bearing canes may be provided for every season. This renewal or long cane is very simple, and requires much less cutting than the spur. It also produces a superior quality of fruit, but in general not so large a quantity.

Thinning the Fruit.—When the fruit attains the size of a garden pea, one third of the smaller ones should be cut out carefully with pointed scissors (see implements) that are prepared for this purpose. The object of this is, to allow the fruits to swell out to their full size. Varieties that produce very compact bunches require more severe thinning than those of a loose, open bunch.

Cleaning the Vine.—At the time the vines are taken from their winter quarters and trellised, they should be well washed with a solution of soft soap and tobacco-water, to kill all eggs of insects, and remove all loose bark and filth that may have accumulated on them during the season previous. The house, too, should be cleaned and renovated at the same time.

Syringing the Vines and the Fruit.—Every one who has a grapery must be provided with a good hand-syringe, for this is necessary during the whole season. As soon as they begin to grow, they should be occasionally syringed in the morning, except while they are in bloom. After the fruit has set, they should be syringed every evening, and the house kept closed until the next forenoon when

the sun is out warm. The inside border should receive frequent and ample supplies of water. In a dry time the outside border should also be freely watered.

Regulating the Temperature.—When the temperature exceeds ninety to one hundred degrees, air should be admitted at the top, and, if necessary, at the bottom. The admission of abundance of air is one of the important features of the management of the grapery.

To Prevent Mildew.—This may be looked for in July. Syringing freely night and morning, and the admission of air during the warmest hours of the day, are the best preventives of this disease. Dust sulphur on the floor, at the rate of one pound for every twenty square feet; and if the mildew continues to increase, syringe the vines in the evening, and dust the foliage with sulphur.

This is but an imperfect outline of the management of a cold grapery. Those who wish full information on all points of the subject, should consult some of the special treatises on the culture of the grape under glass.

ORCHARD HOUSES.

The advantages of glass structures for the growing of all varieties of fruits are but yet little appreciated. By means of the orchard house, peaches, apricots, and indeed all varieties of fruits may be grown without fear of insects or frost.

By it the owner of a small garden or city lot can secure to himself a large amount of fruit grown in a small space, and at a time when it cannot be purchased.

To the commercial fruit-grower the orchard house offers pecuniary profit from the sale of fruit; and to the nurseryman it is becoming yearly more and more a necessity, toward testing the correctness of new varieties from which to propagate.

The construction of an orchard house is similar to that

of a grapery, except that it should be higher at the sides, with the roof more flattened, in order that the trees may be brought as near the glass as possible. Ventilation is an important item, as too great heat, or a confined atmosphere, are incompatible with success. A span-roof house should have ventilators all along the bottom and top, and lean-to houses require even more openings than span-roofs.

Mr. Rivers, of England, who first set in motion the art of fruiting trees in the house, built his first houses like sheds, or what is termed lean-to, and so far the most of the structures erected in this country for this purpose have been of that style. The house of Mr. Pullen, in New Jersey, which has proved a commercial success, is fourteen feet wide and one hundred feet long. The house of Mr. Lovering is the same width, with the back wall twelve feet and the front wall four feet high. Fig. 145 is an end view, taken from Dr. Norris' work on "Fruit Trees in Pots," in which the interior arrangement is given as follows: "The fruit border (three feet six inches wide) is raised nine inches above

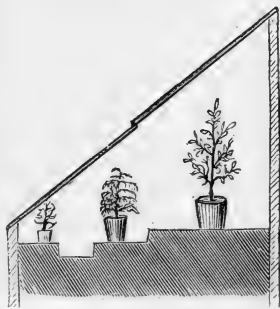


Fig. 145.--END VIEW OF HOUSE.

the walk (which is two feet six inches wide); the first back border is three feet wide and raised sixteen inches above the walk. The second back border is raised one foot above the front one and is four feet wide."

In "Peach Culture," by J. A. Fulton, a lean-to house, twelve feet wide by fifty feet long, is described, with the back wall fourteen feet high and the front four feet (see fig. 146). In this house it will be seen that the lower range of sash is hung on hinges to a plate securing the lower ends of the upper sash, and no other ventilation is supplied, except by the opening of doors. It is designed, in

this house, to grow the plants in the ground, not in pots or tubs—a practice which we, from our own experience, cannot recommend.

Some years since we built upon our own grounds a span-roof house, twenty-five by seventy feet, which we have used very successfully (fig. 147). The interior arrangement is with border along the sides, a walk three feet wide

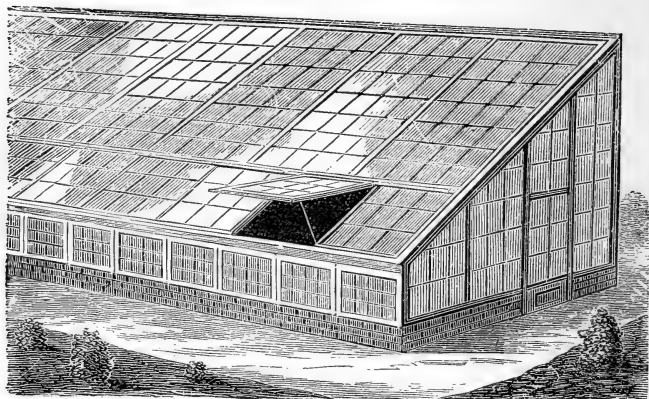


Fig. 146.—PEACH-HOUSE (from *Fulton's Peach Culture*).

all around, and a bed in center, the beds or tables all on the same level.

The advantages of a span-roof house over a lean-to, by the greater and more equable diffusion of light, and the more tasteful appearance which can be made both outside and inside, point to it as the most desirable.

Fig. 148 shows a section of a movable house on iron supports, the house fourteen feet wide and constructed of length as desired. These houses are built in England—our sketch is from Pearson—but we do not know of any in this country.

Although the first growing by Mr. Rivers was of trees in a house free from artificial heat, yet he has found the advantage of heating, and it is proved that with us a

certain amount of artificial heat is necessary, in order to get the fruit much in advance of what it would be out of doors.

Varieties of Trees.—The peach, nectarine, apricot, plum, and cherry are the fruits for which the orchard-house may be said to have been specially designed, and if the house be small, they alone should occupy it. Large houses will, of course, give room for the pear and apple, for the fig, orange, etc.

It is not absolutely necessary that the varieties be

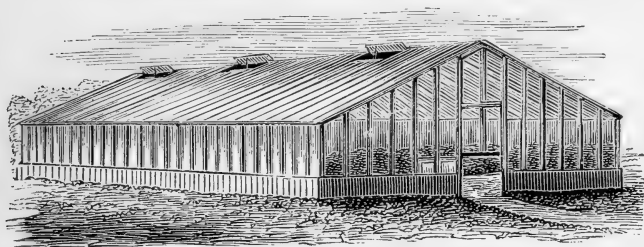


Fig. 147.—SPAN-ROOF ORCHARD-HOUSE.

worked on stocks as dwarfs, but when such can be had, the peach and nectarine on the plum, and the cherry on the mahaleb, will be found to assist toward early maturity, and the compressed artificial growth which the restricted limits of this mode of culture command.

Trees in Tubs or Pots.—The first orchard-house growing of trees was in pots, but we have found in practice that boxes of about fifteen inches diameter at top, ten inches at bottom, and twenty inches deep, with the bottom board set an inch or more above the side pieces (see fig. 149), and with holes for drainage, gave us better stowage when we desired to pack away the trees for winter, and were also less liable to accident and injury, which sometimes occur from breaking of pots. It has been asserted that the porous nature of the pots was an advantage, but we found success in the boxes, as do hundreds of

others who for years grow oleanders, figs, oranges, etc., in tubs. One-year-old trees from the nursery are the best with which to commence.

Management.—The young tree being potted, using good, fresh turf loam two parts, and one part well-decomposed manure, cut it back to about one foot, and if there are any side branches grown, cut them back to one or two buds. The first season the tree may be grown in the open air, the pots or boxes plunged in the ground. As the

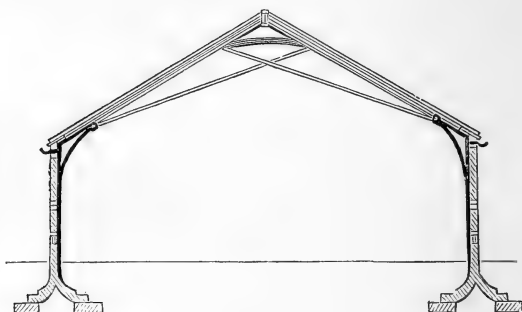


Fig. 148.—SECTION OF MOVABLE HOUSE ON IRON SUPPORTS.

young shoots grow, the side branches should be stopped when they have made a foot or so of growth. Watering must be attended to during the heat of summer, but as autumn approaches it should be graduated, in order to have the wood ripen off finely.

In autumn, as soon as the wood is well ripened, or on approach of cold weather, the trees should be removed to the house, the boxes plunged in soil, and the whole covered with mats or straw. If the house is not ready, the trees may be stacked on their sides in a shed, and protected by having straw or leaves packed in, among, around, and over them.

We have found this practice quite successful and much superior to that of a cellar.

If fire heat is to be used, it should be started sometime in January, and the temperature by day kept at from 80° to 90° , sinking at night to from 40° to 50° . If the fruit is to be obtained by means only of the protection and heat of the glass, then the trees should remain covered until all risk of severe frosts has passed. As the season advances the heat will, of course, be increased. Great care should be given to the watering, keeping the trees always moist, but never wet, and also to ventilation. The spring or winter pruning is best done just as the trees come into bloom, but if the summer pinching is attended to there will be little or no occasion for any winter pruning.

The introduction of bees into the house at blooming time will assist greatly in fertilization. In their absence the tree should be occasionally jarred by a slight blow

from the hand. As the period of ripening approaches, or as soon as they begin to show color, the trees should be removed to a warm, sheltered spot in the open air, and the boxes plunged in the ground. During the season, or until the tubs are removed to the open air, for ripening the fruit, they should be lifted and turned every ten days to check the growth of outside roots. Watering with liquid manure assists in giving vigor to the tree, and size



Fig. 149.—TREE GROWN IN BOX.

to the fruit. The aphid and red spider are best kept in check by fumigating with tobacco.

Propagating Houses.—Small glass houses for the purpose of propagating rare plants, keeping plants in winter, or starting them forward in the spring, may be built very cheaply, and, attached to any considerable garden, may be made both profitable and pleasantly useful.

The span-roof house costs really but a trifle more than

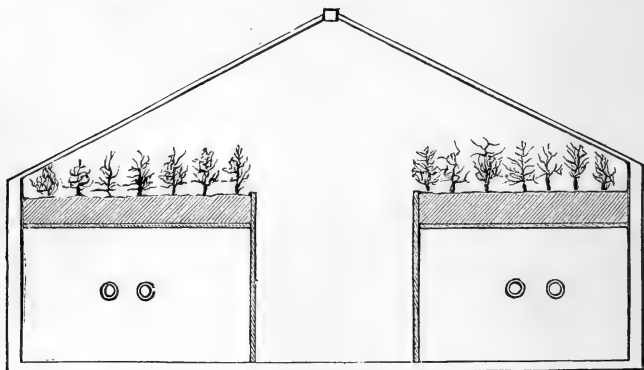


Fig. 150.—SECTION OF PROPAGATING-HOUSE.

a lean-to, when the surface covered is estimated, and it is so much more ornamental, so much easier managed, and the opportunity to give plants the position and light required, is so much greater, that we wonder it is not more generally adopted.

It is not always possible to select a location in just the best place, but when this can be done the ends of the house should be north and south, and it should be where perfect drainage may be had, after having excavated three feet deep, for the purpose of sinking the side walls below the level of the ground, and thereby reducing the expense of heating. Twelve feet is a good width, while the length may be regulated to suit the proprietor's wants.

Heating with hot water is unquestionably best, but many good houses are now, and will continue to be, warmed by means of brick flues, or, what is perhaps better and cheaper, by sections of stone pipe.

A series of connected houses, that we have built, are twelve feet wide and eighty feet long, and we know of nothing better, for a single house, than one of these by itself (fig. 150). In this the sashes are fixed permanently to the ridge-pole and plate, and ventilation obtained by cutting away the sash-bars at top, at distances of ten feet, and forming a frame to be hung on hinges. Movable sash-bars or frames are by some preferred, and where there is any other use for them than as applied to the house proper, they are probably best.

Bottom heat is obtained when the house is heated by flues or pipes, by simply inclosing the space along one side, below the bench, with boarding, leaving the upper board hung on hinges, so that the heat may be let into the house as required.

Tanks of hot water as the base for forming bottom-heat are also used, and when great care is practised they are of the best; but there is a liability to dampness in houses so heated, and in extreme cold weather it is difficult to get heat in the main part of the house without too much for the plants.

SECTION 9.—PRUNING AND TRAINING THE FILBERT.

The filbert in this country is a neglected fruit. It is seldom found in the garden, and more rarely still in a prolific, well-grown condition. Of all other trees, it requires regular and proper pruning to maintain its fruitfulness. The blossoms are monœcious—that is, the male organs, which are in long catkins (fig. 37), are produced from one bud, and the female flowers from another.

The blossom or fruit buds are produced on shoots of

one year's growth, and bear fruit the next. The fruit is borne in a cluster on the end of a small twig produced from the bud bearing the female organs.

It is said that in the neighborhood of Maidstone, county of Kent, England, the filbert orchards occupy several hundred acres, and from these the principal supply of the London market is obtained. One acre has been known to produce £50 sterling, or \$250 worth, in one season. The pruning of these Kent growers is supposed to be most perfect of its kind, especially for their soil and climate. It is described as follows in the "Transactions of the London Horticultural Society :"

"The suckers are taken from the parent plant generally in the autumn, and planted in nursery beds (being first shortened to ten or twelve inches), where they remain three or four years. They are slightly pruned every year, in order to form strong lateral shoots, the number of which varies from four to six. But though it is the usual practice to plant the suckers in nursery beds, I would advise every one to plant them where they are to remain, whether they are intended for a garden or a larger plantation; and after being suffered to grow without restraint for three or four years, to cut them down within a few inches of the ground. From the remaining part, if the trees are well rooted in the soil, five or six strong shoots will be produced. Whichever method is practised, the subsequent treatment of the trees will be exactly the same.

"In the second year after cutting down, these shoots are shortened; generally one third is taken off. If very weak, I would advise that the trees be cut quite down a second time, as in the previous spring; but it would be much better not to cut them down until the trees give evident tokens of their being able to produce shoots of sufficient strength. When they are thus shortened, that they may appear regular, let a small hoop be placed

within the branches, to which the shoots are to be fastened at equal distances. By this practice two considerable advantages will be gained—the trees will grow more regular, and the middle will be kept hollow, so as to admit the influence of the sun and air.

“In the third year a shoot will spring from each bud; these must be suffered to grow until the following autumn, or fourth year, when they are to be cut off nearly close to the original stem, and the leading shoot of the last year shortened two-thirds.

“In the fifth year several small shoots will arise from the bases of the side branches which were cut off the preceding year. These are produced from small buds, and would not have been emitted had not the branch on which they are situated been shortened, the whole nourishment being carried to the upper part of the branch. It is from these shoots that fruit is to be expected. These productive shoots will in a few years become very numerous, and many of them must be taken off, particularly the strongest, in order to encourage the production of the smaller ones, for those of the former year become so exhausted that they generally decay; but whether decayed or not, they are always cut out by the pruner, and a fresh supply must therefore be provided to produce the fruit in the succeeding year. The leading shoot is every year to be shortened two-thirds, or more should the tree be weak, and the whole height of the branches must not exceed six feet.

“The method of pruning above detailed might, in a few words, be called a method of spurring, by which bearing shoots are produced, which otherwise would have had no existence. Old trees are easily induced to bear in this manner, by selecting a sufficient number of the main branches, and then cutting the side shoots off, nearly close, excepting any should be so situated as not to interfere with the others, and there should be no main branch di-

rected to that particular part. It will, however, be two or three years before the full effect will be produced. By the above method of pruning, thirty hundred per acre have been grown in particular grounds and in particular years, yet twenty hundred is considered a large crop, and rather more than half that quantity may be called a more usual one; and even then the crop totally fails three years out of five; so that the annual average quantity cannot be reckoned at more than five hundred per acre.

“When I reflected upon the reason of failure happening so often as three years out of five, it occurred to me that possibly it might arise from the excessive productiveness of the other two. In order to insure fruit every year, I have usually left a large proportion of those shoots which, from their strength, I suspected would not be so productive of blossom-buds as the shorter ones; leaving them more in a state of nature than is usually done, not pruning them so closely as to weaken the trees by excessive bearing, nor leaving them so entirely to their natural growth as to cause their annual productiveness to be destroyed by a superfluity of wood. These shoots, in the spring of the year, I have usually shortened to a blossom-bud.”

Such is the management of these celebrated filbert growers, their principal object being to keep the trees small, open in the center, and covered in every part with fruit spurs. A similar system, but less severe in the cutting back, may be pursued here; some such course of treatment as recommended for the head of the quince as to form and fruitfulness.

Instead of relying on the spring pruning to subdue vigor and induce fruitfulness, pinching should be practised during the summer; for this not only checks the production of wood, but of roots. Root pruning, too, may be safely practised in August, when pruning and pinching of the branches prove insufficient.

In all cases, suckers must be completely eradicated

every season, or as soon as they make their appearance. The want of pruning, and the growth of suckers, make the filbert in nearly all our gardens completely barren; a rank production of wood only is obtained year after year.

We find that grafting the finer kinds on stocks of the common filbert raised from seed, renders the trees much more prolific naturally, and also smaller in size. We have trees here now bearing only three years from the graft; the stems are eighteen inches to two feet high, and they are very pretty. Their natural vigor is greatly subdued by the graft. The French conduct them in pyramids with great success, on the same principle as other trees.

SECTION 10.—CULTURE, PRUNING, AND TRAINING OF THE FIG.

In the Northern States the fig is cultivated with very little success in the open ground, but fine crops are produced in the vineries recommended for foreign grapes; and it is in these only that its culture can yield any considerable degree of satisfaction, north of Maryland at least.

Propagation.—The surest and best mode is by layers. A large branch may be layered in the spring, and will be sufficiently rooted in the fall to be planted out. Cuttings also strike freely, and make good plants in one season. All the modes of propagation recommended for the quince, may be applied to the fig. Cuttings are generally preferred in the South.

Soil.—It succeeds in any good, rich, warm garden soil, suitable for other fruit trees. In very light or dry soils the fruits fall before maturity, as they require at that season in particular a large amount of moisture; but it is better that it be too dry than too moist, for in the latter case nothing but soft unripe and unfruitful shoots are obtained, whilst in the former, moisture can be supplied at

the time when it may be required. The wood should be short-jointed, the buds not more than one-fourth an inch apart. In England dry chalky soils produce the finest crops.

Pruning.—The fig is somewhat peculiar in its mode of bearing. No blossoms appear, but the figs are produced on the stem, appearing at first like buds. The young shoots of last season bear fruit the next; and the shoots produced during first growth produce fruit the same season, and this is called the “second crop.” These never ripen, and should never be encouraged where the plants require protection. In warm climates, as in some of our Southern States, these two crops ripen perfectly, though the first from the previous season’s wood is larger and better.

This mode of bearing shows that little pruning is necessary, beyond the cutting away of old or worn-out branches, and thinning and regulating others. Unfruitful trees, in a moist and rich ground, should be pinched in summer to check their growth, and concentrate the sap more in the lateral buds. *Root-pruning*, too, may be applied as on other trees. Mr. Downing recommends this in his “Fruits and Fruit Trees.”

Training.—Wherever the trees are hardy enough to withstand the winter without protection, as in the Southern States or California, they may be grown in the form of low standards, as recommended for the peach; but when protection is required, where the branches have to be laid down and covered during winter, they must be grown in stools or bushes, with a dozen or more stems rising from the socket. These are easily laid down and covered, and easily brought up to their places again, in the way that raspberry canes are managed. To produce this form, the young tree is planted in the bottom of a trench about a third deeper than in ordinary cases, and a basin is left around it. At the end of the first season’s growth, it is cut back to a few inches of the base; there

a number of shoots are produced. As these grow up the earth is drawn in around them, to favor the production of other shoots at their base; and in this way it is managed until the requisite number of branches is obtained.

Protection.—Trained in this way, a trench is opened for each branch, or three or four may be put in one trench, if convenient; they are fastened down with hooked pegs as in layering, and covered with a foot of earth, which should be drawn up in the mound form, to throw off the water.

The fig is sometimes grown, at the North, in large pots or tubs, and stored in a cool cellar or pit during winter.

Ripening the Fruit.—In fig-growing countries, and to some extent here, there is a practice of applying a drop of olive oil to the eye of the fruit, to hasten its maturity. This is usually done by means of a straw.

Training in Graperies.—The back wall of a lean-to cold vinery is an excellent place for the fig. It may be trained on a trellis in a fan or horizontal manner, but severe pruning must not be practised to produce regularity.

SECTION 11.—PRUNING THE GOOSEBERRY.

The gooseberry produces fruit buds and spurs on wood two years old and upwards. Fig. 151 represents the two-year-old wood, *A*, with fruit buds *C*, *C*, and *B*, the one-year-old wood with wood buds, *D*, *D*. Of these wood buds, the upper one next season would produce a shoot, and the lower ones would probably be transformed into fruit buds. At the base of one of the fruit buds, *C*, may be seen a small wood bud, *d*; this during next season will produce a small shoot or spur. The great point to aim at in this country must always be to maintain a vigorous condition; the moment the plant becomes feeble or stunted, the fruit is so attacked with mildew or rust as to be utterly

worthless. Hence it is that young plants usually bear excellent crops for the first or second year, while after that the mildew is in some varieties and situations unconquerable.

The bush should have a stem of three or four inches in height, and a head composed of five or six main branches placed at equal distances and inclined outwards, to prevent denseness and confusion in the center. These main branches should be furnished with bearing wood in all their length. The production of such a bush may be accomplished by the following means:

Supposing the young plant as it comes from the nursery to be either a two-year-old cutting, or a one-year bedded layer; in either case it will have a stem of two or three inches at least, and a few branches at the top. Before planting, all the buds on the part of the stem to be below the ground are cut out, to prevent them from producing suckers. Among the branches, three of those most favorably situated, are selected for the formation of the head, and the others are cut out entirely. The reserved branches are then cut back to two or three buds; from these one shoot is taken on each branch, and the others are pinched to favor this. By this method we shall have three stout shoots in the fall. If the plant had been well rooted,

instead of being newly transplanted, we might have taken two shoots instead of one from each shortened branch. These three branches are cut back at the next pruning to three or four buds, and from each two new shoots are taken, giving at the end of that season six stout young shoots, situated at equal distances.



Fig. 151.

Branch of the gooseberry. *A*, two-year-old wood; *B*, one year; *C*, *C*, fruit-buds; *D*, *D*, wood-buds; *d*, a small wood-bud at the base of fruit-bud *C*.

At the next or third pruning these branches are cut back about one-half, in order to produce lateral branches and fruit spurs. At the fourth pruning, the leading shoot is shortened one-third to one-half. Any lateral branches not required to fill up spaces, or such as are improperly placed, are cut back to three or four buds, so as to convert them into fruit-branches.

In this way the pruning is conducted from year to year. When the plants become feeble from overbearing, the fruit branches may be headed down and replaced by new vigorous shoots. The better way, however, to provide for this difficulty, is to raise young plants from layers or cuttings, to be at once substituted for such as fall a victim to the mildew. A northern aspect, a cool, damp, substantial soil, and abundance of manure, are all necessary, in connection with the pruning described, to produce fine gooseberries.

The famous growers of Lancashire, England, outdo all the world besides in the production of large gooseberries. The Encyclopædia of Gardening says: "To effect this increased size, every stimulant is applied that their ingenuity can suggest; they not only annually manure the soil richly, but also surround the plants with trenches of manure for the extremities of the roots to strike into, and form round the stem of each plant a basin, to be mulched, or manured, or watered, as may become necessary. When a root has extended too far from the stem it is uncovered, and all the strongest leaders are shortened back nearly one-half of their length, and covered with fresh marly loam, well manured. The effect of this pruning is to increase the number of fibres and spongioles, which form rapidly on the shortened roots, and strike out in all directions among the fresh, newly stirred loam, in search of nutriment."

They also practise what they term *suckling* their prize fruit. By preparing a very rich soil, and by watering,

and the use of liquid manure, shading and thinning, the large fruit of the prize cultivator is produced. Not content with watering at root, and over the top, the Lancashire connoisseur, when he is growing for exhibition, places a small saucer of water immediately under each gooseberry, only three or four of which he leaves on a tree; this he technically calls suckling. He also pinches off a great part of the young wood, so as to throw all the strength he can into the fruit.

SECTION 12.—PRUNING AND MANAGEMENT OF THE CURRANT.

The red and white currants bear, like the gooseberry, on wood not less than two years old, and therefore the same system of pruning may be applied to them. The most convenient and easily-managed form in which they can be grown, is that of a bush or small tree, with a stem of three to six inches high, and a head composed of a certain number, say six or eight principal branches, situated at equal distances, and not nearer to one another at the extremities than six or eight inches.

These branches are produced by cutting back the young shoots found on the nursery plant, as recommended for the gooseberry. They are afterwards annually shortened to produce lateral branches, when wanted, and fruit spurs. Care must be taken not to prune too close, as this causes the buds on the lower parts to make wood instead of fruit spurs: one third, and in many cases one fourth, will be quite sufficient.

The Currant as a Pyramid.—The currant is very easily formed into pretty pyramids. The mode of conducting them will be similar to that recommended for other trees.

A good strong shoot must first be obtained to commence upon; this is cut back, and laterals produced as though it were a yearling cherry-tree. Summer pruning

and pinching must be duly put in practice, under any form, to keep up an equality of growth among the shoots, and to check misplaced and superfluous ones. This will obviate a great deal of cutting at the winter or spring pruning. Mr. Rivers, in his "Miniature Fruit Garden," says: "A near neighbor of mine, an ingenious gardener, attaches much value, and with reason, to his pyramidal currant trees; for his table is supplied abundantly with their fruit till late in autumn. The leading shoots of his trees are fastened to iron rods; they form nice pyramids about five feet high; and by the clever contrivance of slipping a bag made of coarse muslin over them as soon as the fruit is ripe, fastening it securely at the bottom, wasps, birds, flies, and all the ills that beset ripe currants are excluded."

The Currant as an Espalier.—It is sometimes desirable, both to economize space and to retard the period of ripening, to train currants on a north wall or trellis; and this is very easily done with success. We have seen the north side of a neighbor's garden fence completely covered with currants without any system whatever being pursued in laying in the branches. The plants were about five feet apart, and the branches were fastened to the wall in a sort of fan form. The proper way to treat the currant as an espalier is, to produce two strong branches on a stem six to twelve inches high. These branches are trained out in a horizontal manner like two arms—one on each side; and from the shoots which they will produce, as many as are to be had at the distance of six inches from one another are trained in an upright position, as in the grape vine (fig. 137).

These upright shoots are managed in the same way as the branches of a bush; they are annually shortened back a little to insure a good supply of fruit buds.

The Black Currant produces its best fruit on the wood of the preceding year, therein differing from the others.

In pruning it, the young wood must be preserved, and branches that have borne must be cut back to produce a succession of new bearing wood, as in the filbert.

Manuring.—No other fruit tree is so patient under bad treatment as the currant, and yet none yields a more prompt or abundant reward for kindness. In addition to the annual pruning described, the bushes should receive a dressing of old, well-prepared manure, two or three inches deep, spread all around as far as the roots go, and forked lightly in. It is a great feeder, and, without these annual dressings, the soil becomes so poor that the fruit is really not worth gathering.

PLANTING, PRUNING, AND TRAINING THE RASPBERRY.

Planting.—The raspberry succeeds well in all good garden soils in the Northern States, but the foreign varieties (*Rubus Idæus*) do not succeed at the South or Southwest. The most advantageous and economical position for a raspberry bed in the garden is generally in the wall border, facing north. In this situation the fruit ripens sufficiently, and the canes are not so liable to suffer from alternate freezing and thawing in the winter. The young canes or suckers are shortened full one half, and planted at the distance of two or three feet. Any flowers that make their appearance on them the first season should be removed, in order to turn all the sap to the benefit of the leaves and new roots, and the production of a young cane for the next season.

Pruning.—The stem is biennial—that is, the canes are produced one season and bear fruit the next, and then die. For example, in fig. 152, *A* is the old cane that has borne, and is of no further use. *B* is the young cane produced at its base last season. The fruit buds produce small shoots, *a, a, a*, that bear the fruit. The pruning is very simple; it consists merely in cutting away early in the

spring the old cane that has borne. Some people do this as soon as the fruit is gathered, on the ground that the young cane is strengthened by so doing; but this is questionable. It may be, on the whole, safer to leave it to finish its natural course, and cut it away at the spring or winter pruning.

The young cane is shortened to three feet, or three and a half or four, if it be quite stout and vigorous. When the plants have been a year or two in their place, several canes will be produced from one stool in the same season; but three or four only are reserved, and these the strongest. Each one is pruned or shortened as above in order to concentrate the sap on the bearing buds on the center and lower parts. This not only increases the size, but improves the quality of the fruit. When the suckers become very numerous, they enfeeble the plant, and it soon becomes worthless. All the weaker superfluous ones should be carefully removed with a trowel early in the season, say when they have attained five or six inches of growth. In selecting such as are to be reserved, preference should be given to those being nearest in the regular row of plants. Some of the French authors recommend leaving a hole ten or twelve inches deep around each plant at the time of planting, to be filled up gradually, three or four inches a year, with fresh earth, to promote the formation of vigorous radical buds, at the collar of the root, as recommended for the fig.

Summer Pruning.—The foregoing is designed for the annual or winter pruning, but if summer pruning is prac-

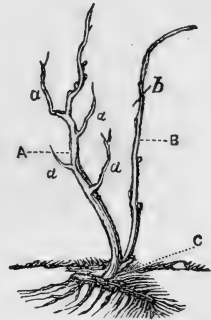


Fig. 152.

The Raspberry. *A*, the old cane that has borne and will be cut away; *B*, the young cane for next season, to be shortened at cross line *b*; *C*, radical bud, to produce a cane next season.

tised all that will be needed in the autumn is to cut away the canes that have borne fruit.

In summer pruning, as soon as the young shoots have grown to a height of two and a half or three feet, they should have the ends pinched in. This will soon cause them to produce laterals or side branches, and these again, as soon as they have made a growth of one foot, should be pinched back, and at the same time the shoot from the top bud of the cane should be shortened. This causes the plants to become stocky and self-supporting.

Manuring.—A liberal dressing of well-decomposed manure should be given them every fall, worked carefully in among the roots with the digging fork. With this treatment a bed will continue productive for seven years at least.

Training.—M. Dubreuil describes a very pretty and simple method of training practised in France, and I had

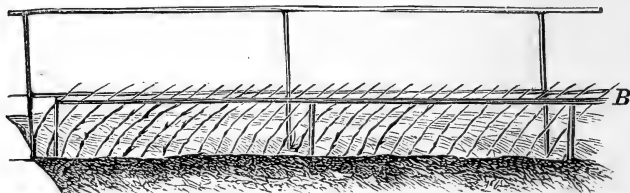


Fig. 153.—FRENCH MODE OF TRAINING THE RASPBERRY TO STAKES AND ROPES.

the pleasure of seeing it carried into practice in the Rouen Garden (fig. 153).

The railing *B* is a narrow strip of board, or a small pole, supported on upright stakes; it is eighteen inches from the row of plants, and three feet from the ground. When the young bearing canes are pruned in the spring, they are bent over and fastened to this rail; and thus the young suckers grow up without mixing with the fruit branches; consequently the fruit ripens better and is more easily gathered. During the summer, when the

young suckers destined to bear the year following have reached the height of two feet, they are fastened to a similar rail on the other side of the row, and the same distance from the line of the ground.

The following is an English mode of training described in the "London Gardeners' Chronicle." In fig. 154, the uprights between every two or three plants are iron, and

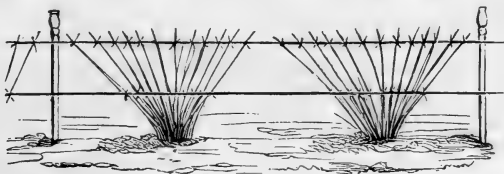


Fig. 154.—ENGLISH MODE OF TRAINING THE RASPBERRY.

the horizontal lines to which the canes are attached, are tarred rope.

In fig. 155, the plants are supposed to be placed in rows four feet apart, and about the same distance from one another in the row. The number of shoots on each is regulated during the growing season, no more being

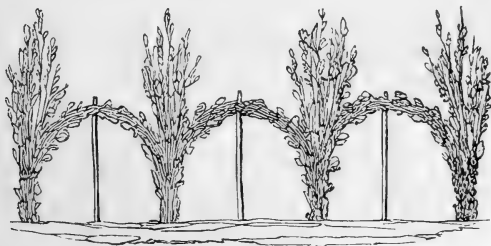


Fig. 155.—ENGLISH MODE OF TRAINING THE RASPBERRY TO STAKES.

allowed to remain than the plant is capable of supporting. In most cases six or eight shoots will be sufficient. Where this method is practised, a row of raspberries in autumn will have something of the appearance represented in fig. 155; the arched portion, tied to the stake

in the center, being the canes which bore fruit last year, and which must be cut down to the bottom, and be replaced by the upright shoots of last summer.

In this last arrangement, five or six fruit-bearing canes are tied together to one stake, and it is impossible that the fruit can either ripen well or be gathered easily. The two first are good and simple plans.

Where summer pruning is practised no training will be needed, but in absence of that operation being performed we have practised driving stakes at distances of twelve feet or so along the row, and then simply securing a cord at one end of the row, pass it along one side, just under the side branches, giving a tie around each stake, and the same on the opposite side, thus securing the canes from falling to the ground, and yet leaving them free and open to air and sunshine. After fruiting the cord can be taken off and laid away for another year.

Protection in Winter.—All the foreign, or, as commonly termed, Antwerp varieties, require winter protection in the northern sections of the States, and, indeed, they are

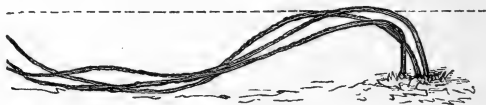


Fig. 156.—COVERING RASPBERRIES WITH THE SPADE.

the better, wherever grown, for a slight protection during the winter months.

In garden culture the canes are bent down and earth covered over them with a spade to the depth of two to three inches (fig. 156), the dotted lines being the top of the covering of earth.

In the field or large plantations, a plow is run along by the side of the row, and a shallow furrow opened (*a*, fig. 157); then a man or boy follows, and, bending the canes down into it (*b*), secures them in place by draw-

ing over them a little earth, either with the hand or foot; the plow then returns, throwing the furrow over and upon the plants a depth of one to four inches (see dotted lines in fig. 157). Another way of covering is to first lay down the canes along the line of row, securing by a little dirt on their ends, and then turn a furrow with the plow towards them on each side. This

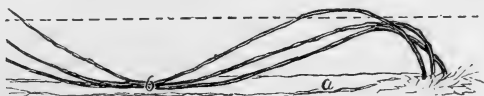


Fig. 157.—COVERING RASPBERRIES WITH THE PLOW.

makes the center between each row to act as a drain for surface water. The canes should be left until the buds begin to swell in the spring, as, if taken out too early, they are liable to be killed by frosts. In localities where snow usually covers the ground during winter, merely laying the canes upon the ground and covering the ends with a little earth is sufficient.

PLANTING, PRUNING, AND TRAINING THE BLACKBERRY.

The blackberry requires a deep moist soil, not wet, but it is not particular whether clay or sand. The canes are planted at distances of six to eight feet apart, according to the strength of the soil. Cover the crown of the root not more than two inches deep, same as with the raspberry.

Prune the cane at planting the same as the raspberry, and pursue the same system of summer pruning or pinching, only leaving the main stems from four to six feet long, and the side branches fourteen to eighteen inches. Tying the blackberry canes to wires or stakes is an unpleasant labor, and we have found that stout stakes along the rows at distances of sixteen to twenty feet, with a No. 12 wire stretched along each side at three to four feet

from the ground, according to the height of the plants, a good support and economical in labor-saving. The wire, at time of pruning away the old bearing canes, may be removed from one side, and again replaced after the pruning is done. Covering the blackberry for winter protection is the same as that of the raspberry.

CULTURE AND MANAGEMENT OF THE STRAWBERRY.

The strawberry is not difficult to suit in regard to the nature of the soil, for every year we see abundant crops gathered from a variety of soils, differing widely in character, from a light sand to a heavy clay.

The best soil is a deep, strong, sandy loam, but any soil suited to the growth of ordinary field or garden crops may be trusted for successfully growing the strawberry. This should be broken up and pulverized by spade trenching (page 72) or subsoil plowing (page 71), and enriched by the admixture of good stable manure to the depth of full two feet. The quantity of manure will, of course, be regulated by the condition of the soil. New soils of good quality, unexhausted by cultivation, will require very little, just enough to quicken those chemical changes which it is necessary the elements of fertility should undergo to convert them into a nutritive state. In old, pretty well-worn soils a coating of three, four, or even six inches of manure should be spread on the surface before the trenching or plowing begins, and be regularly incorporated with the soil during the operation. If this trenching or plowing can be done in the autumn, all the better, and the soil should be left as rough as possible, so that the frost will act upon it efficiently during the winter. Then before the plants are set in the spring, the ground should be turned over once more so as to loosen it and incorporate the various parts thoroughly with one another. The beneficial effects of manure depend much,

in this as in all cases, upon its even distribution in the soil. Some old gardens become infested with grubs which live upon the roots of plants and often cut off all crops. In such cases, a dressing of soot, or fresh lime, or salt, at the time of trenching or plowing, will have a good effect.

It is almost unnecessary to say that all soils of a wet nature, whether arising from springs or from being so tenacious as to hold rain a long time, should be drained (page 73).

Attention to the subject of draining cannot be too strongly urged upon all cultivators, and especially cultivators of fruit, and the strawberry grower should constantly remember that the certainty, excellence, and profusion of the crop depend mainly upon the *richness*, *depth*, and thorough *drainage* of the soil.

Transplanting.—Next to the preparation of the soil an important item is, *when* to plant. All seasons, in the hands of skilful persons, and with care in shading, etc., are successful, but the months of April and May in the spring, September and October in the fall, throughout the Northern States, January, February, and March in the South, are periods when the least care is required to insure the greatest success.

Fall planting at the North involves necessity of winter protection, which it is requisite to give in such a manner, and with such material, that the plants may be prevented from being thrown out by the frost, and at the same time not smothered by the mulch of leaves, straw, etc., being too thick and heavy on their crowns. Early fall planting almost always insures new roots, as the soil is warm and the roots form rapidly; it is also a season when the ground works finely and the demand for labor on other crops is reduced. For large plantations, we, however, prefer the spring, just about the time when the ground is dry and warm, and the plants are beginning to grow. One plant in a thousand need not be lost at this time, if the ground

has been properly prepared, the plants in good order, and the work done reasonably well.

The ground being properly prepared and made smooth with a harrow, the planting should be in straight rows, using a line, and may be done with a dibble, or by furrowing the line lightly with a shovel, or double mould-board plow, and then drawing the earth in around the plant, as it is placed, with the hands. This gives opportunity for a better spreading of the roots, and in practice has been found even more rapid than dibbling.

In extensive field culture the system of rows is the most advantageous, and they should be three and a half to four feet apart, with plants one foot apart in the row, to admit of the passage of the horse-hoe or cultivator between them.

The arrangement of plants in beds is a matter upon which cultivators differ in opinion and practice. That which we



Fig. 158.—DIAGRAM OF STRAWBERRY-BED.

regard as offering the greatest convenience in a garden plantation is to divide the ground into beds of four feet wide, each of which may contain three rows of plants, the two outside

rows six inches from the edge of the beds (fig. 158).

The plants may stand twelve inches apart in the rows, or in the case of very strong growing sorts, such as Trollope's Victoria and some other English varieties, eighteen inches apart. Thus a bed twenty feet long and four feet wide will contain forty to sixty plants.

If the plantation contains several of these beds they should be separated by walks or alleys of two feet in width.

These walks would enable the gardener to perform all the labor the plants would require, and gather the fruit

without stepping on the beds, which is a consideration of some importance. Next to this arrangement I would recommend rows two feet apart, with the plants twelve to eighteen inches apart in the rows (fig. 159). In this case the space between the rows must be used as a path in gathering the fruit and performing the details of culture.



Fig. 159.—DIAGRAM OF FIELD-PLANTING.

Small garden-beds may be made at any time when

the ground is not frozen. The ground should be raked off smooth and even, and the beds or plots and intervening walks marked by the line and a measure. When this is done, then stretch the line where it is intended to put a row of plants, mark off the place for each plant by a measure, and then with a dibble, such as that described on page 147, set the plants, pressing the earth firmly around each with the hand. When the rows are close the plants should be put in quincunx order. This increases the space around each plant.

In a dry time the plants should be well watered before they are taken up, and the ground well watered before they are planted; then they must be protected from the hot mid-day sun until they have taken root.

In planting spread out the roots and cover them with soil, but avoid covering the crown with earth.

The plants should invariably be of one season's growth, from the seed or runner, and well rooted. Where only a few plants are needed, those nearest the parent plant should be selected, as they possess a greater degree of vigor.

They should always be taken up in a moist time if possible, and before planting the roots should be dressed by cutting off the extremities, and the older, imperfect, or bruised foliage should also be pruned off; these operations facilitate the process of re-rooting. We find it very

good to dip the roots, after being dressed, in mud made of loamy soil and old manure well mixed with water, about as thick as common paint.

In compact soil a little sand about each plant, thrown into the bottom of the hole made by the dibble, will hasten the growth of young roots materially. No fresh manure should be used in any case whatever.

It is essential in the culture, in order to produce good crops, that the runners or new forming plants be kept from growing just the same as if they were weeds. Early in the spring, if the plants have been mulched, they should be gone over with a rake, and the mulch all removed from the crown or center, and as soon as the ground is in condition to work, all between the rows and among the plants should be spaded or plowed as deeply as possible. All weeds should be kept down, and just before the fruit commences to ripen a layer of straw or fresh-mown grass should be placed along just under the foliage and around the plants, for the purpose of keeping the fruit clean.

After the crop has matured, if plants are wanted, the ground should be again dug or plowed and the mulch removed, when an abundance of new plants from runners will soon form. If in the garden, and another year's crop is to be provided for, then a light dressing of well-rotted manure should be dug in, and during the remainder of the season all runners prevented from growing and weeds kept down.

For field crops, if the plantation has borne but one year, then go through between the rows and plow deep, leaving only the hills or narrow rows; smooth down with the one-horse harrow and cultivator, and then from time to time go through with the cultivator, to keep down all weeds and runners. If the plantation has borne two crops, then give a dressing of well-rotted manure along between the rows, plow deep, harrow down smooth, and let the

runners or new plants form along into it, being careful to keep down weeds.

The new plants will all be formed by September, when the plow may again be used and the rows of old plants turned under, leaving the new plants for the next crop. The most successful growers practise taking but one crop from a plantation. In so doing, they plant in spring, permit the runners to grow as they please, but keep down all weeds, and the ground thoroughly cultivated. The crop is made the second season, and then the plantation destroyed.

SUNDRY OPERATIONS CONNECTED WITH THE CULTURE OF FRUIT TREES.

1st. *The Annual Cultivation of the Soil.*—The soil around fruit trees should, especially in the garden, be kept in a clean, friable condition by the frequent use of the hoe and the spade; but in all these operations the roots must not be injured. The forked spade (see Implements) is the best for operating about the roots.

2d. *Manuring.*—The very common practice in regard to the use of manure, is to apply none for several years, until the trees have begun to show signs of feebleness and exhaustion, when large quantities are applied, thus inducing a rank, plethoric growth, that can scarcely fail to be seized with diseases. The proper way is to apply a small dressing of well-decomposed material, like some of the composts recommended, every autumn. This should be forked in around the extremities of the roots. There may be rich soils where this will be unnecessary; but most ordinary garden soils require it.

3d. *Mulching.*—This should be a universal practice in our dry and warm summer climate, not only with newly-planted trees, but all, and especially dwarfs in the garden whose roots are near the surface. Three or four inches

deep of half-decayed stable manure or litter makes a good mulching. It should be applied in May, and remain all summer. After the fall dressing a mulching for the winter will protect the roots and base of the tree from injury; it should be so well decayed as not to attract vermin.

4th. *Watering*.—In dry times, and especially in light, dry soils, fruit trees will derive vast benefits from a liberal syringing overhead in the evening, with a hand or garden syringe (see Implements). A reservoir in the garden is therefore desirable, and at a point easy of access from all the quarters of the garden. This watering refreshes the trees, drives away insects, mildew, etc., and washes off dust and filth that may accumulate on the foliage and fill up the pores. It is more necessary in city and village than in country gardens.

Protecting Trees against Extremes of Temperature.—Where the trunk or large branches are liable to injury from sudden changes of temperature in the winter, or from a powerful sun in summer, they may be covered thinly, with long rye straw, fastened on with willows. The trunk alone is more easily protected by means of two boards nailed together, forming an angle for the tree. This is placed on the south side, the injury being induced chiefly by the sun at both seasons.

Newly-transplanted trees, especially if they have tall trunks, and are somewhat injured before planting, may be saved by wrapping them lightly with straw; a straw rope rolled around answers the purpose. A little damp moss is still better; an occasional watering will keep it cool and moist, and enable the sap to flow under the bark.

Renovating pyramidal trees of Apples and Pears that have become enfeebled or unproductive by age, bad soil, bearing, or bad pruning.—There are two methods of doing this successfully. One is, to cut back all parts of the tree. The stem may be cut back half its length, the lateral

branches at the base to within twelve or fifteen inches of the stem, and shorter as they advance upwards, so that those at the top will be cut to four or six inches. This will preserve the pyramidal form.

It may appear unnecessary to cut back the stem, but we find when this is not done it is almost impossible to secure an equal growth between the upper and lower parts, because the wood at the top is young, and attracts the sap much more than the wood at the base of the old branches below. For a few years after this renewal the young wood at the top must be kept very closely pruned, to prevent it from absorbing more than its due proportion of the sap. When growth commences on trees thus cut back, a large number of shoots will be produced. Amongst those on the stem, a strong and well-placed one must be selected for a leader, and its growth favored by checking those around it. Leaders for each of the lateral branches must be selected and encouraged in the same way. The future management will be similar to that described for the formation of young trees. We have succeeded well with a large number of trees thus treated. Where the soil is defective, it must be improved and renewed with fresh soil and composts, so that abundant nutriment shall be given to the new growth.

The second method of renewal referred to is, that of cutting back as already described, and grafting each branch.

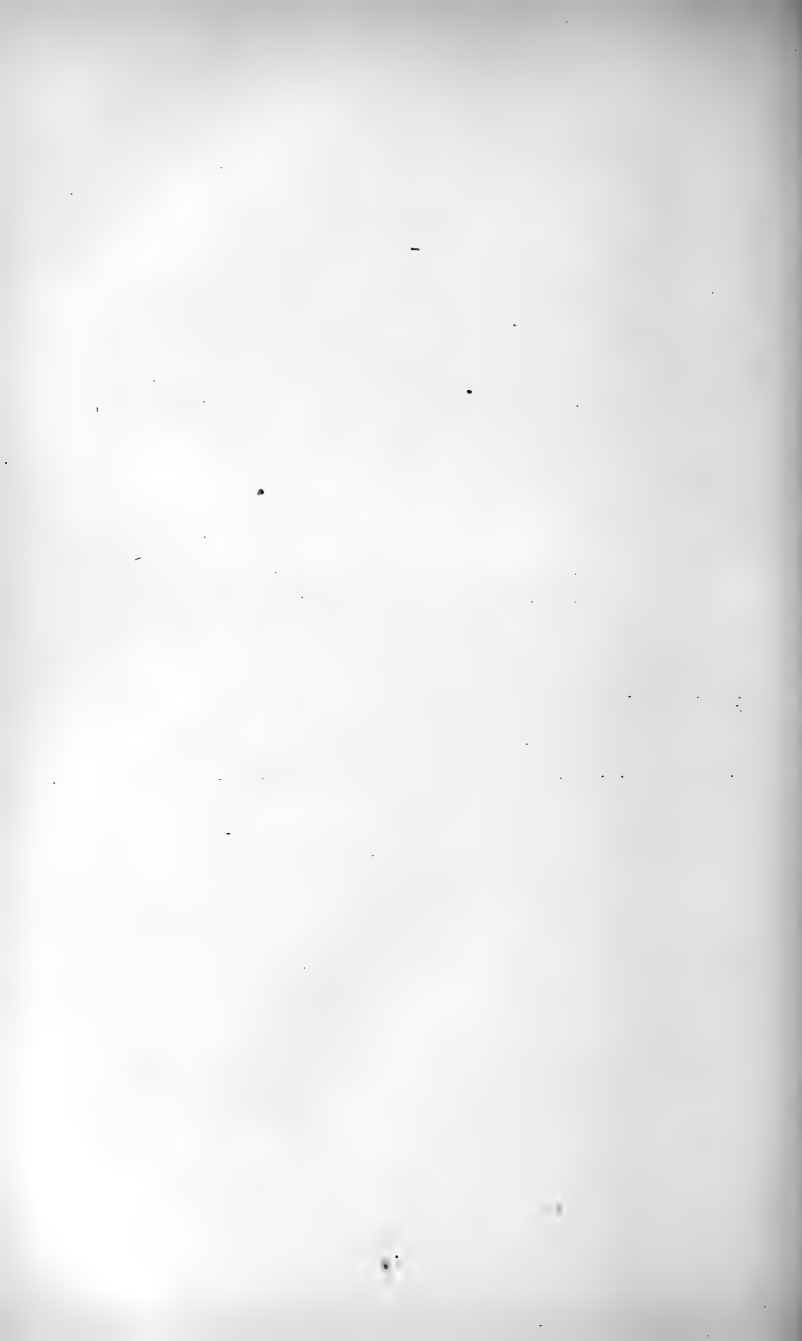
The process of regrafting old orchards of standard apple-trees, it is well known, renews their vigor, and replaces old, worn-out, and deformed branches with young and vigorous ones, giving to the entire head a healthy and youthful appearance. In many cases this grafting will be much more successful than simply cutting back, for the cions, being furnished with young and active buds that develop leaves at once, attract the sap from the roots, place it in contact with the atmosphere, and carry on the formative process in all parts of the tree with less inter-

ruption and greater activity than where reliance is placed upon the production of new shoots on the old wood; for this must be effected by awakening dormant buds, which in many cases takes place slowly and with more or less difficulty.

PART IV.



SELECT VARIETIES OF FRUITS—GATHERING AND
PRESERVING FRUITS—DISEASES—INSECTS
—IMPLEMENTS IN COMMON USE.



CHAPTER I.

ABRIDGED DESCRIPTIONS OF SELECT VARIETIES OF FRUITS.

THE accumulation of varieties of fruits within the last twenty years has been so great, that anything like a complete description or account of them all, would in itself exceed the bounds of a moderate-sized volume. Taken altogether, there are perhaps at this moment no fewer than *four thousand different varieties* under cultivation. To trace out the history, the peculiar characters and merits of these, must be the work of the pomologist, and forms no part in the design of this treatise. In making the following selections, and in describing them, pomological system and minuteness have not been deemed essential, nor would they be practicable within the necessary limits.

The main object aimed at is, to bring to the notice of cultivators the *best varieties*, those which ample experience has proved to be *really valuable*, or which upon a partial trial give strong indications of becoming so. Nothing is more embarrassing to the inexperienced cultivator than long lists; and many will no doubt be inclined to think that a large number of the following varieties might very well be dispensed with. But it must be remembered that our country, even the great fruit-growing regions of it, possess different climates, that there are various qualities of soils, various tastes and circumstances of individuals, to be provided for. A dozen or twenty sorts of apples or pears may be as many as one person

may require ; but it does not follow that these varieties *only* are to be cultivated, for it is very probable that another individual, residing even in the same State, would make a selection entirely different. New York, Massachusetts, New Jersey, Pennsylvania, Ohio, Kentucky, and other States, have all *varieties of their own* ; and by the time each has made a selection, our one hundred and fifty varieties will be appropriated, and a deficiency still exist in all probability. We are not of those who cry out against new varieties. On the contrary, we look upon every one of *real excellence* as an additional blessing to the fruit growers and to society, for which they should be duly thankful. The only thing to be observed in regard to them is, that before entering into general cultivation they should be fairly and carefully tested under various circumstances. Some well-meaning persons make a great outcry against nurserymen and others, whose business it is to experiment, for extending their lists or noticing new varieties, and against horticultural societies for offering premiums for large collections. If such a spirit had prevailed, what would our fruits have been to-day ?

It is by no means presumed that the following lists are perfect, even as far as they go. No individual possesses such a thorough knowledge of the various soils and climates of our country, or of the varieties of fruits best adapted to them, as to enable him to recommend with infallible correctness special lists for all localities.

In attempting this, reliance must be placed upon the experience and reports of others, and these are always liable to be biased by tastes or prejudices. These things have been kept in view, and wherever recommendations are made beyond our own knowledge and experience, they are based upon the most reliable authority, and it is hoped will not be found wholly unserviceable to those especially who have neither had experience nor access to sources of extensive and minute information. Those who

are not satisfied with the abridged descriptions are referred to works more strictly pomological.

The arrangement of varieties under the heads of *Summer*, *Autumn*, and *Winter*, is for the purpose of assisting the reader in selecting varieties ripening at particular seasons, while the terms early or late summer, etc., in place of the month, is because of its better application to the various States and sections of States. For instance, the Early Harvest ripens at the South early in June, and at the North early in July, but in each section it is classed as ripening in early summer.

Synonyms have been omitted in most cases, because of the want of room, and because the work is intended as a guide to the planter, rather than a work on pomology. When inserted they are in SMALL CAPITALS. The name given to each fruit is the recognized name of the American Pomological Society so far as recorded in their Catalogue.

FIRST DIVISION.--KERNEL FRUIT--APPLES, PEARS, AND QUINCES.

SECTION 1.—SELECT APPLES.

CLASS I.—SUMMER APPLES.

American Summer Pearmain.—Medium size, oblong; skin smooth, red and yellow; flesh tender, juicy, rich, sub-acid.—Late Summer. Tree a moderately vigorous grower, upright; bears early. A valuable sort for family use; not profitable in orchards.

Benoni.—Origin Massachusetts. Medium size, roundish oblate; yellow, shaded and striped with red. Stem short, calyx closed; flesh yellow, juicy, tender, sub-acid.—Mid-Summer. Tree a vigorous upright grower, hardy and productive. A valuable variety for market or table use.

Carolina Red June.—Origin South. Medium or below in size, oval or conic; purplish red, on yellow ground; stem variable, calyx closed; flesh tender, juicy, brisk sub-acid.—Early Summer. Tree a vigorous, upright grower, good bearer; valuable as an orchard sort South and West. Successful in New York.

Carolina Watson.—Large, roundish, flattened; greenish, shaded and striped with red; flesh white, coarse, mild sub-acid.—Mid-Summer. A Southern variety not valued at the North.

Early Harvest.—Origin American. Medium size, roundish oblate; skin smooth, light pale yellow; stem medium; flesh white, tender, juicy, rich, sub-acid.—Early Summer. Tree a moderate grower, erect, spreading as it grows old, productive. A valuable variety for market or table use in almost every section.

Early Joe.—Origin New York. Small size, oblate; yellowish, covered, striped, and shaded with red; flesh tender, juicy, rich, sprightly vinous sub-acid.—Mid-Summer. Tree a slow, upright grower, very productive; valuable for the garden.

Early Pennock.—Origin American. Large size, roundish, ribbed; yellow, shaded with red; flesh whitish, rather coarse, sub-acid.—Late Summer. Tree a strong grower, productive; valued as a market sort in parts of Ohio especially.

Early Red Margaret.—Origin foreign. Medium or below in size, roundish ovate; skin yellowish, striped and marbled with dull red; flesh white, tender, crisp, sub-acid, agreeable.—Early Summer. Tree a moderate grower and bearer.

Early Strawberry (RED JUNEATING of some).—Origin New York. Small, roundish, slightly conical; skin smooth, yellowish, striped, shaded, and mostly covered with red; flesh white, tinged with red next the skin, tender, sprightly;

pleasantly sub-acid and perfumed; very good.—Middle to late Summer. Tree a moderate upright grower, an abundant bearer, ripening its fruit along evenly for a month or more; valuable for orchard or garden.

Golden Sweet.—Origin Connecticut. Medium or above, roundish, pale yellow; flesh yellowish, tender, sweet, rich.—Mid-Summer. Tree a strong grower, spreading, a good bearer; valuable for cooking, market, or stock.

Hightop Sweet (SWEET JUNE).—Origin Massachusetts. Medium or below in size, roundish, light yellow; flesh yellowish, sweet, pleasant, very good.—Mid-Summer. Tree vigorous, upright, productive; valued for the market orchard.

Large Yellow Bough (EARLY SWEET BOUGH).—Origin American. Large, oblong, ovate; skin smooth, greenish yellow; flesh white, tender, sprightly, rich, sweet.—Early to mid Summer. Tree moderately vigorous, compact, good bearer; one of the best for table or market.

Primate.—Probably American. Medium, roundish oblate; greenish white, blush cheek in the sun; flesh white, very tender, sprightly, mild sub-acid.—Late Summer. Tree a vigorous grower, upright, very productive; an excellent dessert sort; too tender for distant market.

Red Astrachan.—Origin Russian. Large, roundish, nearly covered with deep crimson and a thick bloom; flesh tender, juicy, rich acid.—Mid-Summer. Tree vigorous, strong grower, upright, spreading, good bearer; well known as one of the most profitable of orchard sorts, and valuable for the dessert when gathered at the right time. Probably the most profitable early summer apple in every part of our country from Maine to California.

Summer Hagloc.—Origin American. Medium to large, roundish oblate; yellow, striped and splashed with red, slight bloom; flesh white, tender, juicy, sub-acid.—Late Summer. Tree a vigorous, stocky, short-jointed grower,

making a handsome round head, productive. An old sort, but comparatively little known; valuable for orchard or garden.

Summer Queen.—Origin New York. Large, conical; striped and shaded with red; flesh aromatic, whitish yellow, rich and agreeable.—Late Summer. Tree vigorous, spreading, productive; a popular and successful market sort.

Summer Rose (LIPPINCOTT'S EARLY, etc.).—Origin New Jersey. Medium or below in size, roundish, smooth; yellow, streaked and blotched with red; flesh tender, juicy, rich, delicious, spicy sub-acid.—Middle to late Summer. Tree moderately vigorous, hardy; an early and productive bearer, highly valued as a dessert fruit.

Summer Sweet Paradise.—Origin Pennsylvania. Large, round, slightly oblate; greenish yellow; flesh very tender, juicy, crisp, rich aromatic sweet.—Late Summer. Tree vigorous, spreading, productive; a valuable dessert sort, too tender for market.

Tetofsky.—Origin Russia. Medium, oblate, nearly round; yellowish, striped and shaded with red, thick whitish bloom; flesh white, juicy, sprightly acid, fragrant.—Early Summer. Tree vigorous, upright, with large foliage, which most Russian varieties seem to have; very hardy; an early and abundant bearer, valued as an orchard sort.

Townsend (HOCKING, etc.).—Origin Pennsylvania. Medium, oblate; pale yellow, striped with red, thin bloom; flesh white, tender, mild, agreeable sub-acid.—Late Summer. Tree vigorous, upright grower, good bearer; an old sort, valued for market in some localities.

Trenton Early.—Origin American. Medium or above, irregular, slightly ribbed; yellowish and green; flesh light, tender, pleasant sub-acid.—Middle to late Summer. Tree moderately vigorous, very productive.

William's Favorite (WILLIAM'S RED, etc.).—Origin Massachusetts. Medium, roundish oblong; light and dark red; flesh yellowish white, mild sub-acid.—Middle to late Summer. Tree a moderately vigorous upright grower, good bearer; a beautiful and popular market sort.

CLASS II.—AUTUMN APPLES.

Alexander.—Origin Russian. Large or very large, conical; yellow, mostly shaded with red, light bloom; flesh yellowish white, tender, juicy, pleasant sub-acid.—Middle to late Autumn. A superb fruit. Tree a vigorous spreading grower, and when grown as a dwarf, producing fruit of the largest size and greatest beauty.

Autumn Sweet Bough (FALL BOUGH, etc.).—Origin Pennsylvania. Medium, conical; pale yellow; flesh white, very tender, sweet, vinous.—Early Autumn. Tree vigorous, upright, productive; a highly, esteemed dessert variety.

Autumn Swaar (SWEET SWAAR, etc.).—Origin New York. Medium or above, roundish oblate; yellow, with blush in sun; flesh yellowish, tender, moderately juicy, rich, sweet.—Early Autumn. Tree vigorous, spreading, productive; highly esteemed for orchard and garden.

Beauty of Kent.—A well-known popular English variety. Large to very large, roundish; greenish yellow, with broken stripes of red; stem short, calyx small; flesh juicy, crisp, tender, sub-acid.—Late Autumn and early Winter. Tree very vigorous, upright, and moderately productive; a showy fruit, and highly valued for cooking.

Campfield (NEWARK SWEETING).—Origin New Jersey. Medium, roundish oblate; greenish yellow, with shades and stripes of red; flesh white, dry, firm, rich, sweet.—Late Autumn, but will often keep until Spring. Tree a moderate, healthy grower, spreading, very productive; this is

a celebrated cider apple in New Jersey, and is valued for baking and stock feeding.

Carter's Blue.—Origin Alabama. Large, roundish, flattened; greenish, mostly covered with dull red and a blue bloom; flesh yellowish white, sugary, rich, aromatic.—Early Autumn. Tree a fine upright grower and an early bearer; popular in some parts of the South.

Chenango Strawberry (SHERWOOD'S FAVORITE, etc.).—Origin New York. Medium, oblong, conic; shaded, splashed, and mottled with crimson red and white; flesh white, tender, juicy, mild sub-acid.—Early Autumn. Tree vigorous, spreading; wherever grown this is highly esteemed as a table fruit of fair quality and great beauty.

Cornell's Fancy.—Origin Pennsylvania. Medium, oblong, conical; yellow, shaded with crimson red; flesh white, tender, crisp, juicy, pleasant sub-acid. Tree vigorous and productive.

Duchess of Oldenburgh.—Origin Russian. Medium to large, roundish; streaked and shaded red on yellow; flesh white, juicy, sprightly, sharp sub-acid.—Early Autumn. Tree vigorous, upright, spreading, an early and abundant bearer, and very hardy. This variety is probably more generally cultivated West and North-west than any other. Everywhere it succeeds and proves profitable as an orchard variety.

Dyer (POMME ROYALE, GOLDEN SPICE, etc.).—Origin foreign. Medium size, roundish; greenish yellow, with blush in sun; flesh white, very tender, juicy, sprightly aromatic, mild sub-acid.—Mid-Autumn. Tree a moderate grower, productive; this is one of the best of dessert apples, but too tender and not showy enough for shipment to distant markets.

Fall Pippin.—Supposed American. Large to very large, roundish, flattened at ends; yellowish; flesh white, tender, rich, aromatic, sub-acid.—Middle to late Autumn.

Tree vigorous, upright, spreading. The Fall Pippin, in sections where there are no great extremes of temperature, is one of the most valuable varieties, either for table or market; popular over a great extent of country.

Fall Wine (OHIO WINE, etc.).—Origin American. Medium or above in size, roundish oblate; light ground mostly covered with red; flesh yellowish white, tender, juicy, rich, aromatic, mild sub-acid.—Mid-Autumn. Tree a slender but healthy grower, moderate annual bearer. This variety fails in most sections East, but in the new, rich soils of the West it is one of the best, and the fruit valuable for dessert or market.

Garden Royal.—Origin Massachusetts. Medium or below in size, roundish oblong; greenish yellow, striped and splashed with red and russet; flesh yellowish, very tender, juicy, rich, mild aromatic sub-acid.—Early Autumn. Tree moderately vigorous, upright, very productive. This is perhaps, in quality, the best apple grown, and desirable for the amateur, but not profitable as an orchard variety.

Gravenstein.—Origin German. Large, roundish, flattened; yellow, shaded and marbled with red; flesh tender, crisp, with a peculiar high, aromatic flavor.—Early Autumn, but sometimes keeps to mid-winter. Tree vigorous, spreading, and very productive; it is one of the most profitable sorts either for orchard or garden.

Hawthornden.—Origin Scotch. Above medium, roundish, slightly oblate; light yellow, with blush in sun; flesh white, juicy, sharp sub-acid.—Early Autumn. Tree vigorous but small, upright, spreading, very productive and hardy; a valuable sort for cooking and drying, and profitable for market.

Jefferis.—Origin Pennsylvania. Medium, roundish; yellow, shaded and splashed with red; flesh white, tender,

juicy, rich, mild sub-acid.—Early Autumn. Tree a moderate, healthy grower, productive.

Jersey Sweet.—Origin unknown. Medium size, roundish, ovate; greenish yellow, washed and streaked with red, and often covered with stripes of pale and dark red; flesh white, juicy, tender, sprightly, sweet.—Early Autumn. Tree moderately vigorous, very productive; highly valued for dessert, cooking, stock, or market.

Keswick Codlin.—Origin English. Above medium in size, rather conical; greenish yellow, with a faint blush in sun; flesh yellowish white, juicy, pleasant sub-acid.—Early Autumn. Tree vigorous, a very early and abundant bearer; one of the most profitable sorts for cooking or market.

Late Strawberry (AUTUMN STRAWBERRY).—Origin New York. Medium size, roundish, slightly conic; flesh yellowish white, tender, juicy, sub-acid.—Late Autumn. Tree vigorous, upright, spreading, an early and abundant bearer.

Lowell (QUEEN ANNE, TALLOW PIPPIN, etc.).—Origin unknown. Large, roundish, oval or conic; waxen yellow, oily; flesh yellowish white; brisk, rich sub-acid.—Mid-Autumn. Tree vigorous, spreading, productive. A valuable variety for either garden or orchard, a fine dessert apple and a showy market fruit.

Lyman's Pumpkin Sweet (PUMPKIN SWEET, VERMONT PUMPKIN SWEET, etc.).—Origin probably Connecticut. Large to very large, roundish; green, with whitish streaks and white dots; flesh white, very sweet.—Early to late Autumn. Tree very vigorous, upright, spreading, valued for baking, stock, or market.

Maiden's Blush.—Origin New-Jersey. Medium size, roundish oblate; pale lemon yellow, with a bright crimson cheek next the sun; flesh white, tender, sprightly, brisk sub-acid.—Early and mid Autumn. Tree a fine grower

with a spreading head, an early and abundant bearer. A profitable orchard sort, valued for table, cooking, or market.

Mangum (FALL CHEESE OF VIRGINIA, etc.).—Medium, flattened, slightly conic; yellowish, mostly covered and striped with red; flesh yellow, tender, juicy, mild sub-acid.—Late Autumn. Tree a healthy, good grower, productive. This is one of the best of Southern apples, has a dozen or more synonyms, and is widely grown South and South-west.

Ohio Nonpareil (MYER'S NONPAREIL).—Medium to large, roundish oblate; yellow, shaded, marbled, and splashed with shades of red; flesh yellowish white, fine-grained, tender, juicy, rich aromatic sub-acid.—Late Autumn. Tree vigorous, with stout straight shoots, making a regular, spreading, open head, productive; valuable for table or market.

Porter.—Origin Massachusetts. Above medium size, oblong, narrowing to the eye; bright yellow, with blush in the sun; flesh fine-grained, crisp, firm yet tender, sprightly aromatic sub-acid.—Early Autumn. Tree a moderate grower, forming a low, round, spreading head, productive. Highly esteemed for table or market, and succeeding in all good, rich soils.

Richard's Graft (RED SPITZENBURGH, etc.).—Origin New York. Medium, roundish, flattened; yellow, nearly covered with shades of red; flesh yellowish, tender, juicy, aromatic sub-acid.—Early Autumn.

Rome Beauty.—Origin Ohio. Large to very large, roundish; yellow shaded and striped with red; flesh yellowish, tender, juicy, sub-acid.—Mid-Autumn. Tree a moderate grower, late bloomer, productive.

St. Lawrence.—Supposed origin Canadian. Large, oblate; yellowish, striped and splashed with deep red; flesh white, slightly stained with red, juicy, tender, vinous sub-acid.—Early Autumn. Tree vigorous, upright, productive.

Sops of Wine (HOMINY, etc.).—Origin foreign. Medium, roundish; yellow and red, splashed and shaded with deep red; flesh white, often stained, not very juicy, pleasant sub-acid.—Early Autumn.

Washington Strawberry.—Origin New York. Large, roundish, conical; yellow, shaded, splashed, and mottled with rich red; flesh yellowish, crisp, tender, juicy, brisk sub-acid.—Early to mid Autumn. Tree vigorous, upright, spreading, an early and abundant bearer. A fine market sort.

CLASS III.—WINTER APPLES.

American Golden Russet (BULLOCK'S PIPPIN, LITTLE PEARMAIN, etc.).—Below medium size, roundish, ovate; dull yellow, marbled with thin russet; flesh yellowish, very tender, juicy, rich, spicy.—Early to mid Winter. Tree a moderate upright grower and good bearer; valued for table or market, for West and South.

American Golden Pippin (GOLDEN PIPPIN OF WEST-CHESTER COUNTY).—Medium to large, roundish, slightly flattened; yellow, with a brownish blush in sun; flesh yellowish, juicy, aromatic sub-acid.—Early Winter. Tree a strong grower, making a spreading head; not an early, but abundant bearer.

Baldwin (STEELE'S RED WINTER, etc.).—Origin Massachusetts. Large, roundish, narrowing to the eye; yellow ground, nearly covered with rich, bright red; flesh yellowish white, crisp, juicy, pleasant sub-acid.—Early to late Winter. Tree very vigorous, upright, spreading, an early and abundant bearer. In many sections of New England, New York, Ontario, and Michigan this is one of the most popular and profitable sorts for either table or market. In the South and South-west it matures with the late autumn varieties.

Baltimore (CABLE'S GILLIFLOWER, etc.).—Origin unknown. Medium, roundish, conical, regular; pale yellow, mostly covered with shades of dull, purplish red; flesh whitish, tender, juicy, mild sub-acid.—Early to late Winter. Tree moderately vigorous, making a round, rather drooping head, very productive, and valuable for table or market.

Bailey's Sweet.—Supposed origin New York. Large, roundish conical, slightly oblong; yellow, mostly covered, shaded, and obscurely striped with red; flesh white, tender, very sweet.—Early to mid Winter. Tree vigorous, upright, spreading, productive; valued for table use or near market, too tender for shipping.

Belmont (GATE, etc.).—Origin Pennsylvania. Medium to large, roundish; light waxen yellow, with vermilion-spotted cheek in sun; flesh yellowish white, very tender, juicy, mild, agreeable.—Early to mid Winter. Tree moderately vigorous, productive. A beautiful dessert variety, fine in Northern Ohio and Michigan and New York, but variable South and West.

Ben Davis (NEW YORK PIPPIN, etc.).—Supposed American. Medium to large, roundish, conical; yellow, mostly overspread, splashed, and shaded with red; flesh white, tender, juicy, sub-acid.—Early to late Winter. Tree hardy, vigorous, upright, spreading, productive, blooms late; popular as a market variety at the West and South-west.

Bentley's Sweet.—Supposed origin Virginia. Medium, roundish, flattened at the ends; yellowish green, shaded with pale red; flesh whitish, firm, juicy, sweet.—Late Winter. Tree moderately vigorous, a good bearer; esteemed in rich soils of the South-west.

Bethlehemite.—Supposed origin Ohio. Medium or above, oblate, roundish; yellow, striped, shaded, and splashed with red; flesh white, firm, crisp, juicy, rich,

mild, aromatic sub-acid.—Early to late Winter. Tree a strong, stocky, upright grower, a productive bearer; where known it is highly valued for all purposes.

Bonum (MAGNUM BONUM).—Origin North Carolina. Medium, oblate; yellow, mostly covered with crimson and dark red; flesh white, often stained red next the skin, tender, juicy, rich, mild sub-acid.—Early Winter. Tree vigorous, upright, spreading, an early and abundant bearer.

Broadwell.—Origin Ohio. Medium, oblate, conic; yellow, with dull blush and carmine spots in sun; flesh whitish, firm, juicy, rich, sweet.—Early Winter. Tree vigorous, quite spreading, productive; a valuable apple for table or cooking.

Buckingham (EQUINETELY, FALL QUEEN, etc.).—Origin unknown. Medium to large size, oblate, slightly conic; greenish yellow, mostly covered with rich red; flesh yellowish, coarse, breaking, juicy, sub-acid.—Early Winter. Tree moderately vigorous, hardy, and productive. This variety is widely grown in the South and South-west, and is popular for market or table; it has over twenty synonyms.

Canada Reinette (REINETTE CANADA, etc.).—Origin uncertain, probably foreign. Large to very large, oblate, conical; greenish yellow; flesh rather firm, juicy, lively sub-acid.—Late Winter. Tree vigorous, with an open, spreading head, very productive; a popular variety, successful in most localities.

Cannon Pearmain.—Origin American. Medium size, roundish, conic; yellow, mostly covered with two shades of red; flesh yellow, firm, crisp, rich, brisk sub-acid.—Mid-Winter. Tree vigorous, spreading, productive; esteemed where known South and West.

Cogswell.—Origin Connecticut. Above medium, roundish, oblate; red on yellow ground; flesh yellowish white,

rather firm, juicy, aromatic sub-acid.—Early to late Winter. Tree a hardy, vigorous, upright grower, and good bearer; extremely valuable for orchard or garden.

Cooper's Market (REDLING).—Origin probably New Jersey. Medium, oblate, conic; yellow, shaded and striped with red; flesh white, tender, brisk sub-acid.—Late Winter. A good keeper. Tree hardy, vigorous, upright, productive; considerably grown in Western New York.

Cullasaga.—Origin North Carolina. Medium to large, roundish; yellowish, shaded and striped with dark red; flesh yellowish, firm, moderately juicy, mild sub-acid.—Early to late Winter. Tree a good grower and productive.

Domine (ENGLISH RED STREAK, etc.).—Origin uncertain. Medium size, oblate; greenish yellow, with stripes and splashes of red in sun; flesh white, tender, juicy, sprightly, pleasant sub-acid.—Early and mid Winter. Tree rapid, vigorous grower, and a very early and abundant bearer. It is a popular and profitable orchard sort in most localities.

Dutch Mignonne.—Origin Holland. Medium size, roundish, oblate; yellow, shaded, striped, and splashed with red; flesh yellowish, tender, juicy, slightly sub-acid.—Early to late Winter. Tree moderately vigorous, upright, spreading, hardy and very productive.

English Russet (POUGHKEEPSIE RUSSET).—Origin unknown. Medium size, roundish, slightly conical; greenish yellow, mostly covered with russet; flesh yellowish white, pleasant, mild sub-acid.—Late Winter. Tree a moderate, erect grower, forming a straight, upright, round head, very productive; a profitable variety.

Esopus Spitzenburgh.—Origin New York. Size, above medium to large, oblong, roundish; yellow, mostly covered with rich red; flesh yellow, crisp, juicy, rich, brisk aromatic flavor.—Mid to late Winter. Tree a

healthy but not strong grower, a good but not early bearer. One of the very best for dessert.

Fallwater (TULPEHOCKEN, etc.).—Origin Pennsylvania. Very large, round; yellowish green, dull red shade in sun; flesh greenish white, juicy, tender, pleasant sub-acid.—Mid-Winter. Tree a very strong, rather irregular grower, productive. A popular market sort in many sections. It has many synonyms.

Fameuse (SNOW).—Origin supposed to be France. Medium size, roundish; greenish yellow, mostly covered with dark crimson; flesh remarkable for its snowy whiteness, very tender, juicy, with a slight, pleasant perfume.—Early Winter. Tree moderately vigorous, an early and abundant bearer, very hardy, and highly prized for table or market.

Gilpin (LITTLE ROMANITE, etc.).—Origin Virginia. Small to medium size, roundish, oblong; yellow, mostly covered with red; flesh yellow, firm, juicy, rich. Late Winter. Tree very hardy, vigorous, very productive; an old sort, highly prized South and West for orcharding.

Golden Russet of Western New York.—Medium in size, roundish; yellow, mostly covered with dull russet, frequently a dull blush on one side; flesh greenish white, fine-grained, sprightly, mild sub-acid.—Late Winter. Tree vigorous, spreading, an early and abundant bearer. A popular variety wherever known. It is distinguished among other Russets by its peculiar light-colored speckled shoots.

Green Cheese.—Medium size, oblate; greenish yellow; flesh yellowish white, crisp, tender, juicy, sprightly sub-acid.—Mid-Winter. Tree moderately vigorous, upright, blooms late and bears well. It is largely grown South and South-west.

Green Sweet (HONEY GREENING).—Medium size, roundish, oblate; green, becoming yellowish green at

maturity ; flesh whitish, tender, juicy, sweet.—Mid-Winter. Tree vigorous, upright, spreading, productive.

Grimes' Golden Pippin.—Origin Virginia. Medium size, roundish, oblate ; flesh yellow, tender, juicy, rich, spicy sub-acid.—Late Winter. Tree vigorous, upright, productive. Has been considerably disseminated recently ; will no doubt succeed best West and South.

Hewe's Virginia Crab.—Small, round ; dull red, flesh fibrous, astringent ; valued for cider.

Hubbardston Nonsuch.—Origin Massachusetts. Large, roundish, oblong ; yellow, mostly covered with red ; flesh yellowish, juicy, tender.—Early Winter. Tree a good but irregular, spreading grower, productive ; a popular and valuable sort.

Jonathan.—Origin New York. Medium size, roundish, conical ; yellow, mostly covered with red ; flesh white, tender, juicy, sprightly vinous.—Early to late Winter. Tree a hardy, moderately vigorous grower, upright, spreading, an early and abundant bearer. One of the best and most popular sorts, both East and West, either for table or market.

Junaluskee.—Origin North Carolina. Medium to large, roundish, flattened ; yellow, shaded on the sun side ; flesh yellowish, moderately juicy, sub-acid.—Early to late Winter. Tree a moderately vigorous grower, productive.

King of Tompkins County.—Origin New Jersey. Large size, roundish ; yellow, shaded and striped with red ; flesh yellowish, tender, juicy, rich, vinous, aromatic sub-acid.—Mid-Winter. Tree very vigorous, spreading, productive.

Lady Apple.—Origin France. Small in size, oblate ; lemon yellow, with a brilliant red cheek ; flesh white, crisp, tender, juicy, pleasant.—Mid to late Winter. Tree moderately vigorous, very upright, productive. A beau-

tiful and delicious dessert apple, and a profitable market sort. Commands \$10 to \$20 per bbl.

Lady's Sweet.—Origin New York. Large, roundish; yellowish green, nearly covered with red; flesh tender, juicy, crisp, sprightly, agreeable, sweet.—Late Winter. Tree a thrifty but not strong grower, an early and abundant bearer; valued as a dessert sort and keeper.

Lawver.—Large, roundish, flattened; dark clear red; flesh white, firm, sprightly, aromatic, mild sub-acid.—Late Winter. Tree vigorous, spreading, productive. A new promising variety, recently introduced from Missouri.

Limber Twig.—Origin North Carolina. Medium or above in size, roundish; greenish yellow, shaded with dull red; flesh not very tender, juicy, brisk sub-acid.—Late Winter. Tree vigorous, hardy, productive. A popular market variety South and West.

Melon.—Origin New York. Medium or above in size, roundish, oblate; pale yellow, mostly covered with red, and traces of russet; flesh white, tender, juicy, vinous sub-acid.—Mid-Winter. Tree a slow grower, making a round, small head, good bearer.

Menagere.—Of European origin. Very large and beautiful, much flattened; pale yellow, sometimes blush, red in sun; flesh tolerably juicy; valued for market and cooking. Tree a vigorous grower and a good bearer.

Michael Henry Pippin.—Origin New Jersey. Medium, roundish, oblong; yellowish green; flesh greenish white, tender, juicy, mild, sweet.—Mid-Winter. Tree a good, upright grower, and hardy and very productive.

Monmouth Pippin.—Origin New Jersey. Large, oblate; pale yellow, with a red cheek in sun; flesh juicy, brisk, aromatic sub-acid.—Middle to late Winter. Keeps well. Tree a moderate, upright grower, and productive; a beautiful and excellent fruit.

Moore's Sweet (RED SWEET PIPPIN, etc.).—Medium, roundish, flattened; dark, dull red; flesh yellowish, pleasant, rich, sweet.—Early to late Winter. Tree moderately vigorous, hardy, very productive. A profitable orchard sort for market, cooking, or stock-feeding.

Mother.—Origin Massachusetts. Medium, roundish, slightly conical; yellow, nearly covered, splashed, and marbled with rich shades of red; flesh yellowish, tender, juicy, rich, aromatic sub-acid.—Early Winter. Tree moderately vigorous, upright, productive; a valuable dessert apple.

Munson Sweet (ORANGE SWEET, etc.).—Origin probably Massachusetts. Medium, flat; yellow, with sometimes a blush; flesh yellowish, juicy, sweet.—Autumn and early Winter. Tree a vigorous, spreading grower, and a good bearer.

Newtown Pippin (GREEN NEWTOWN PIPPIN).—Origin Long Island. Medium size, roundish, obscurely ribbed; olive green, brownish on sunny side; flesh greenish white, very juicy, crisp, with delicious aromatic flavor.—Late Winter. Tree a slender, slow grower, on rich soils makes a medium-sized round head, productive. Both this and the Yellow Newtown Pippin require rich soil and good care, and with these are profitable only in particular localities. There is so little difference between the two that many regard them as identical.

Newtown Spitzenburgh (VANDERVERE OF NEW YORK).—Medium size, oblate, roundish; yellow, shaded and striped with red, light bloom; flesh yellow, tender, juicy, rich, sprightly vinous.—Early Winter. Tree moderately vigorous, spreading, very productive; succeeds in nearly all soils, and valuable for table or market. It has ten or more synonyms, and is generally and popularly known in all New York as Vandervere of New York. The name of

Newtown Spitzenburgh having been first given this apple by Coxe, it has again been adopted.

Nickajack (WINTER ROSE, etc.).—Origin North Carolina. Large size, roundish; yellowish, striped and shaded with red; flesh yellowish, moderately tender, juicy, pleasant.—Late Winter. Tree a vigorous, upright, spreading grower, forming a large head, hardy and productive. The variety is extensively grown South and West, and has many synonyms.

Northern Spy.—Origin New York. Large, roundish, oblate, conical; pale yellow, mostly covered, when exposed to sun, with stripes of light and dark red; flesh white, fine-grained, tender, sub-acid, sprightly delicious.—Mid to late Winter. Tree a rapid, upright grower, requires good soil, blooms late, very productive, but not an early bearer; a fruit of unrivalled beauty and excellence.

Ortley (WOODMAN'S LONG, etc.).—Origin New Jersey. Medium to large, roundish, oblong, conic; greenish yellow, fine yellow at maturity; flesh white, fine-grained, tender, juicy, pleasant sub-acid.—Mid-Winter. Tree vigorous, with slender shoots, an abundant bearer. The Ortley has some thirty synonyms, is a hardy tree, and popular South and West.

Peck's Pleasant.—Origin probably Rhode Island. Above medium size, roundish, flattened; yellow, with a blush-red on sunny side; flesh yellowish, fine-grained, juicy, crisp, tender, aromatic sub-acid.—Mid-Winter. Tree a moderate, upright, spreading grower, a regular, even bearer, very valuable for market or table use.

Phillips' Sweet.—Origin Ohio. Above medium, roundish, flattened, inclining to conic; light yellow, shaded and striped, mostly covered with shades of red; flesh white, crisp, pleasant, juicy, rich sweet.—Early to late Winter. Tree a thrifty, upright grower, an early and abundant bearer; one of the finest of sweet apples.

Pomme Grise.—Origin probably France. Below medium size, roundish, oblate; greenish gray, mostly covered with russet; flesh tender and rich.—Mid-Winter. Tree a moderate grower, forming a small head, and bearing early; valued as a dessert fruit.

Pryor's Red.—Origin supposed Virginia. Medium, roundish, oblate; greenish yellow, shaded with red; flesh yellowish, tender, juicy, pleasant sub-acid.—Late Winter. Tree moderately vigorous, upright, spreading, requires a rich soil; much grown and valued in Kentucky.

Rambo (ROMANITE, etc.).—Origin Delaware. Medium size, flat; yellow and red; flesh tender, rich, mild sub-acid.—Early Winter. Tree vigorous, spreading, productive. The Rambo is an old, highly and widely esteemed variety, for orchard or garden.

Ramsdell's Sweet (ENGLISH SWEET, etc.).—Origin unknown. Above medium size, oblong; mostly covered with red, and a bloom; flesh yellowish, tender, sweet, rich.—Early Winter. Tree vigorous, upright, an early bearer.

Rawle's Janet (JENITON, etc.).—Origin Virginia. Above medium size, oblate, conic; yellow, striped and shaded with red; flesh whitish yellow, tender, pleasant, juicy, sub-acid.—Late Winter. Tree very hardy and vigorous, blooms late, productive; largely cultivated in Missouri and other parts of the South-west. At the late meeting of the American Pomological Society, Dr. Howsley, of Kansas, who claims to know the origin of this famous fruit, stated that it should be JEANNETTE.

Red Canada (RICHFIELD NONSUCH, etc.).—Medium, roundish; yellow, mostly covered with red; flesh tender, crisp, juicy, brisk, delicate, mild sub-acid.—Late Winter. Tree a thrifty but slender grower, productive. A popular and valuable sort in all the Middle, North, and West sections; a superior fruit for table or market; very success-

ful and popular in Michigan, where it is frequently called "Steele's Red Winter."

Red Winter Pearmain (BATCHELOR, etc.).—Origin unknown. Medium size, roundish oblong; yellowish white, mostly covered with maroon red; flesh whitish yellow, tender, juicy, mild sub-acid.—Early to late Winter. Tree a moderate, upright grower, and good bearer. This variety has a dozen or more synonyms, under some one of which it is widely grown West and South.

Rhode Island Greening.—Large, roundish; greenish yellow; flesh yellow, tender, juicy, aromatic acid.—Early Winter. Tree a vigorous, strong grower, and very productive. This variety is too well known to need a word. It is one of the most profitable and valuable in almost all the North, but South it drops its fruit too early.

Ribston Pippin.—Origin England. Medium, roundish; greenish yellow, and dull red; flesh yellow, firm, crisp, rich, aromatic.—Early to late Winter. Tree moderately vigorous, spreading, productive; valued in Maine and all Northern sections.

Roxbury Russet.—Origin Massachusetts. Medium to large, roundish, flattened; dull green, covered with brownish yellow russet; flesh greenish white, moderately juicy, sub-acid.—Late Winter. Tree moderately vigorous, productive; an old, well-known, popular sort, successful in all New England and large portions of the Middle and Western States.

Shockley.—Origin Georgia. Below medium size, roundish, conical; yellow, mostly covered with red; flesh crisp, juicy, rich, pleasant.—Late Winter. Tree moderately vigorous, upright, hardy, and very productive; very popular and profitable at the South.

Smith's Cider.—Origin Pennsylvania. Medium to large, roundish; yellow, shaded with red; flesh whitish, crisp, tender, juicy, pleasant, mild sub-acid.—Early to late

Winter. Tree a very vigorous but straggling grower, productive; popular as a market-orchard sort, in many localities; succeeds best from New Jersey southward.

Smokehouse.—Origin Pennsylvania. Above medium, roundish, oblate; yellow, shaded with red; flesh yellowish, juicy, rather rich sub-acid.—Early Winter. Tree moderately vigorous, a good bearer; esteemed where known for market and cooking.

Stanard.—Medium to large, roundish, oblate; dull yellow, splashed and striped with red; flesh yellowish, rather coarse, juicy, sub-acid.—Late Winter. Tree a rapid but crooked grower, very hardy, abundant bearer, and profitable North and West.

Swaar.—Origin New York. Large, roundish; yellow at maturity; flesh yellowish, fine-grained, tender, rich, spicy, aromatic, mild sub-acid.—Middle to late Winter. Tree a moderate grower, good bearer, needs a deep, dry soil and good culture.

Talman's Sweet.—Origin Rhode Island. Medium, round; yellowish; flesh white, rather firm, rich, sweet.—Early to late Winter. Tree vigorous, hardy, and productive; highly valued over a large territory of country, as a profitable orchard sort, for cooking, or stock purposes.

Tewksbury Winter Blush.—Origin New Jersey. Small, oblate, roundish; light yellow, with a red cheek; flesh yellowish, moderately juicy, pleasant sub-acid.—Very late Winter. Tree a rapid, upright grower, very productive; an old sort, valued for its long-keeping qualities.

Twenty-Ounce (CAYUGA RED STREAK).—Origin supposed Connecticut. Very large, roundish; greenish yellow, marbled and striped with purplish red; flesh rather coarse, brisk sub-acid.—Mid-Autumn to early Winter. Tree an upright, thrifty, compact grower, and a good

bearer. It is one of the popular market sorts, always fair and handsome, excellent for cooking.

Wagener.—Origin New York. Medium, roundish, oblate; yellow, mostly shaded with red; flesh yellowish, tender, juicy, brisk, slightly vinous.—Early Winter. Tree a thrifty, upright grower, and an early and over-abundant bearer.

Westfield Seek - no - Further.—Origin Connecticut. Large, roundish, conical; green yellow, mostly covered with dull red; flesh white, fine-grained, tender, rich, sub-acid.—Early to mid Winter. Tree a moderate, healthy, upright, spreading grower, very productive.

White Pippin.—Large, roundish, oblate; greenish, becoming pale whitish yellow at maturity, sometimes a dull blush cheek in sun; flesh white, tender, juicy, crisp, rich, sub-acid.—Late Winter. Tree thrifty, upright grower, and a good bearer; considerably grown in the West and highly esteemed.

White Winter Pearmain.—Medium or above, roundish, oblong; pale yellow, with a blush cheek in sun exposures; flesh yellowish, tender, juicy, pleasant sub-acid.—Late Winter. Tree hardy, vigorous, spreading, productive; esteemed in some localities at the West, little known East.

Willow Twig.—Medium size, roundish, or roundish oblate; yellow, shaded and marbled with dull red; flesh not very tender, pleasant sub-acid.—Very late Winter. Tree hardy, but a spreading, poor grower while young, very productive, and much cultivated at the South-west as a profitable market sort, on account of keeping and carrying qualities.

Wine (WINTER WINE, HAY'S, PENNSYLVANIA RED STREAK).—Origin Delaware. Above medium size, round, or roundish; yellow, mostly covered with lively, rich, deep red; flesh yellowish white, juicy, rich, vinous, pleas-

ant.—Early to late Winter. Tree a thrifty grower, hardy, and very productive; widely successful West and South.

Winesap.—Origin New Jersey. Medium size, roundish, oblong, conical; yellow ground, mostly covered with rich dark red; flesh yellowish, firm, crisp, juicy, rich flavor.—Early to late Winter. Tree a healthy grower, very hardy, an early and abundant bearer; successful and profitable as an orchard variety over a large portion of our country, especially West and South.

Winter Sweet Paradise.—Origin Pennsylvania. Large, roundish, oblate; dull green, with a brownish red blush; flesh white, fine-grained, juicy, sweet.—Early and mid Winter. Tree a vigorous, upright grower, productive, but not an early bearer.

Yellow Bellflower.—Origin New Jersey. Large, oblong, slightly conical; lemon-yellow, usually with a blush in sun exposures; flesh breaking, tender, juicy, sprightly, sharp sub-acid.—Early to late Winter. Tree moderately vigorous, forming a spreading, rather drooping head, not an early but abundant bearer.

Yellow Newtown Pippin.—Above medium to large, roundish oblate; greenish, becoming quite yellow when fully ripe; flesh firm, crisp, juicy, with a rich, high flavor.—Late Winter. Tree a moderate grower, requiring a rich soil, when it is productive and profitable.

CLASS IV.—APPLES FOR ORNAMENT OR PRESERVING.

The Siberian Crabs are beautiful little fruits, varying in size from one to one and a half inch in diameter. They are much esteemed for preserving, and as an ornamental tree, whether in blossom or loaded with their brilliantly-colored fruit, they merit a place in the smallest garden. In extensive grounds they may be planted in groups, producing a fine effect.

Cherry Crab.—Small, roundish, pointed; light yellow, shaded with red; flesh crisp, pleasant; hangs long on the tree.—Early Autumn. Tree a moderate, healthy grower, makes a handsome round head.

Hyslop.—Large, for a crab, roundish, egg-shaped; dark, rich red, with a thick blue bloom; flesh yellowish; fine for cooking or cider; bears in clusters. Tree a strong, spreading grower.

Lady Crab.—Small, roundish, flattened; rich dark red, with some russet; flesh yellowish, mild sub-acid. Tree a vigorous, very upright grower. A foreign variety of great beauty.

Large Red Siberian Crab.—Nearly twice the size of the common Siberian crab; yellow, shaded, on sun side, with bright red. Tree very vigorous, forming a large head; valued for preserving.

Large Yellow Siberian Crab.—Resembles the foregoing except in the shape of its fruit, which is more oval, and the color a light, clear yellow.

Montreal Beauty.—Large, roundish, flattened; bright yellow, mostly covered with clear, bright, rich red.

Oblong Siberian Crab.—Medium size, oblong in form; beautifully shaded with rich crimson; thin bloom.

Red Siberian Crab.—Small, roundish; bright lively scarlet, over a close yellow ground, light bloom; an old, well-known sort.

Transcendent.—Large, roundish oblong, slightly flattened; golden yellow, with a crimson cheek in sun, white bloom, often the red nearly covers the entire surface. It is highly prized in some sections as a table fruit in autumn. Tree a strong, rapid grower and abundant bearer.

Yellow Siberian Crab.—The fruit of this is a trifle larger than Red Siberian, and is of a fine, clear yellow color.

There have recently been introduced a number of new seedling crabs, originated chiefly at the West. Some of them are described as keeping into mid-winter, some of such quality as to fit them for the dessert, and all represented as valuable, in the extreme North and North-west, for their hardiness.

They are a highly interesting class of fruits, and quite likely to prove valuable.

SELECT LIST OF APPLES.

The following varieties are recommended for the Eastern and Middle States.

Summer.—Early Harvest, Early Strawberry, Golden Sweet, Large Yellow Bough, Red Astrachan, Williams' Favorite.

Autumn.—Chenango Strawberry, Duchess of Oldenburg, Fall Pippin, Gravenstein, Hawthornden, Jefferis, Jersey Sweet, Lowell, Lyman's Pumpkin Sweet, Porter, St. Lawrence.

Winter.—Baldwin, Esopus Spitzenburgh, Fameuse, Golden Russet of Western New York, Hubbardston Nonsuch, Jonathan, King of Tompkins County, Lady Apple, Monmouth Pippin, Mother, Northern Spy, Peck's Pleasant, Pomme Gris, Red Canada, Rhode Island Greening, Roxbury Russet, Talman's Sweet, Twenty-Ounce, Wagener, Yellow Bellflower.

For the West and South:

Nearly all the summer and fall varieties of the Eastern and Middle States succeed well at the West and South. The winter varieties specially adapted to those regions are so designated in the previous lists. In California and Oregon our best Northern sorts generally succeed, but the winter varieties of the South will be better adapted to

the warmer districts of California, than our Northern winter sorts.

CHOICE GARDEN VARIETIES.

Red Astrachan, Early Strawberry, Early Joe, Keswick Codlin (cooking), Summer Rose, Duchess of Oldenburgh, Fall Pippin, Gravenstein, Garden Royal, Dyer, Fameuse, Jonathan, Lady Apple, Melon, Northern Spy, Pomme Gris, Red Canada, Swaar, Esopus Spitzenburgh, Wagener.

TWENTY VERY LARGE AND BEAUTIFUL SORTS FOR DWARFS.

Red Astrachan, Large Sweet Bough, Beauty of Kent, Alexander, Duchess of Oldenburgh, Fall Pippin, Williams' Favorite, Gravenstein, Hawthornden, Maiden's Blush, Porter, Menagère, Baldwin, Bailey Sweet, Canada Reinette, Northern Spy, Mother, Rambo, Twenty-Ounce, Wagener.

SECTION 2.—SELECT PEARS.

CLASS I.—SUMMER PEARS.

Bartlett (WILLIAMS' BONCHRÉTIEN, etc.).—Origin England. Large, obtuse, pyriform; bright, clear yellow, when fully ripe, sometimes a little russet; flesh white, buttery, juicy, musky perfume.—Late Summer. Tree an upright, thrifty, healthy grower, very productive. The Bartlett is one of the few good pears that succeed everywhere; it has no competitor as a summer market fruit; bears early as a standard.

Beurré Giffard.—Origin France. Medium size, pyriform; greenish yellow, with considerable red in sun; flesh white, melting, juicy, vinous, perfumed.—Late Summer. Tree a slender grower, healthy, hardy, very productive; a beautiful fruit and the best of its season; should be gathered early.

Bloodgood.—Origin Long Island. Medium size, turbinate, fleshy at base of stalk; skin yellow, with russet dots and network markings; flesh yellowish white, buttery, melting, sugary, very aromatic.—Mid-Summer. Tree is hardy, with close, firm, short-jointed wood, an early and abundant bearer; a delicious pear, but not attractive for market.

Brandywine.—Origin Pennsylvania. Medium size, pyriform; dull yellowish green, slight touch of russet, and blush cheek on sun side; flesh white, juicy, melting, vinous, aromatic.—Late Summer. Tree an upright, vigorous grower, with rich glossy foliage and very productive.

Clapp's Favorite.—Origin Massachusetts. Large, obovate; pale yellow, marbled and splashed with red and light brown; flesh white, fine-grained, juicy, melting, buttery, rich, vinous, perfumed, sweet.—Late Summer. Tree an upright, spreading, open grower, bearing its fruit evenly distributed, very productive; a comparatively new variety of great promise, supposed to be a cross between Flemish Beauty and Bartlett; the tree resembles the former, the fruit the latter.

Dearborn's Seedling.—Origin Massachusetts. Below medium size, roundish, oval; skin smooth, light yellow, or straw color; flesh white, very juicy, sweet, melting, sprightly.—Late Summer. Tree a fine grower, an early and profuse bearer. The tree is quite hardy and succeeds in almost all localities; very fine for the dessert.

Doyenné d'Été (SUMMER DOYENNÉ).—Origin Belgium. Small, roundish; fine yellow, often with a bright red cheek in sun; flesh white, melting, juicy, sweet, pleasant.—Mid-Summer. Tree an upright, vigorous grower, an early and abundant bearer; this is the first to ripen of the really good pears.

Duchesse de Berry d'Été.—Origin France. Small,

roundish, slightly pyriform; yellow, shaded with light red, more or less russet, and often a red cheek; flesh juicy, melting, vinous.—Late Summer. Tree a fine, vigorous grower, and a good bearer; an excellent and beautiful fruit, not extensively cultivated.

Madeleine (CITRON DES CARMES).—Origin France. Medium size, obovate, pyriform; bright yellow, with a red cheek; flesh white, juicy, sugary, sprightly, aromatic.—Late Summer. Tree a fine grower, forming a fine, upright head, productive; a very old and excellent sort, not so much planted as formerly, owing to the introduction of new varieties.

✓ **Manning's Elizabeth**.—Origin Belgium. Below medium size, obtuse, pyriform; bright yellow, with a lively red cheek; flesh white, juicy, very melting, sugary, sprightly, aromatic.—Late Summer. Tree a moderate grower, an even, regular bearer; the small size, beauty, and excellent quality of this variety recommend it to all amateurs.

Osband's Summer (SUMMER VIRGALIEU).—Origin New York. Medium size, obtuse pyriform; yellow, dotted with green and brown dots, thin russet, red cheek in the sun.—Mid-Summer. Tree moderately vigorous, upright, an early and abundant bearer.

Rostiezer.—Origin Germany. Medium or below in size, oblong, pyriform; dull yellowish, mixed with reddish brown; flesh juicy, slightly buttery, melting, sugary, vinous, aromatic, perfumed.—Late Summer. Tree a rapid, vigorous, but straggling grower, requiring severe pruning while young to form a good head; bears early and abundantly; a pear of fine quality, but not attractive for market.

Tyson.—Origin Pennsylvania. Medium size, clear yellow, with a bright, red cheek; flesh juicy, very sweet, melting, slightly aromatic.—Late Summer. Tree a vig-

orous, upright grower, not an early bearer, but very productive; a variety of great excellence both in tree and fruit.

CLASS II.—AUTUMN PEARS.

Ananas d'Été.—Origin Holland. Above medium size, pyriform, sometimes obtuse; yellow, with brown russet in sun; flesh fine-grained, buttery, melting, sweet, perfumed.—Early Autumn. Tree vigorous, an early and profuse bearer.

Baronne de Mello.—Origin Belgium. Medium, varying in form, often roundish, acute, pyriform; yellowish, nearly covered with brown russet; flesh whitish, a little coarse, juicy, melting, vinous sub-acid.—Mid-Autumn. Tree productive, hardy, and a vigorous grower.

Belle Epine Dumas (DUC DE BOURDEAUX).—Medium size, obtuse, pyriform; greenish yellow, with russet dots; flesh white, half-melting, buttery, juicy, sweet.—Late Autumn. Tree a vigorous, fine grower, and a good bearer.

Belle Lucrative (FONDANTE D'AUTOMNE).—Medium size, form variable, generally roundish, obtuse, pyriform; flesh melting, juicy, rich, sugary, delicious.—Early Autumn. Tree moderately vigorous, healthy, hardy, and productive.

Beurré d'Anjou (NE PLUS MEURIS OF THE FRENCH).—Origin Belgium. Large size, short or blunt pyriform; skin greenish yellow, with traces of russet, dull crimson dots and sometimes a shade of crimson in the sun; flesh whitish, melting, juicy, brisk, vinous, perfumed, pleasant.—Late Autumn to early Winter. Tree a vigorous, healthy grower, making an open, round-headed tree, that bears its fruit evenly distributed and of uniform size; one of the most profitable varieties for orchard or garden; generally regarded as one of the most valuable pears grown, succeeding everywhere.

Beurré Bosc.—Origin Belgium. Large, pyriform, or long pyriform; dark yellow, often much covered with dull cinnamon russet, in dots or streaks, occasionally a tinge of red; flesh white, very buttery, melting, rich, and deliciously perfumed.—Mid-Autumn. Tree a healthy, good grower, but often irregular; not an early but an abundant bearer, producing its fruit singly, and evenly distributed on the tree; a valuable orchard variety, of splendid appearance and finest quality.

Beurré de Brignais (DES NONNES, etc.).—Medium size, roundish, flattened; greenish, with many dots; flesh melting, juicy, with a brisk, high perfumed flavor.—Early Autumn. Tree a hardy, vigorous grower, productive.

Beurré Clairgeau.—Origin France. Large, pyriform; yellow, shaded with orange and crimson, much dotted and sprinkled with russet; flesh yellowish, juicy, buttery, a little granular, sweet, vinous, perfumed.—Late Autumn to early Winter. Tree very vigorous, with erect habit and fine foliage, an early and abundant bearer, and, although a little variable in quality, its size, beauty, and productiveness make it a very profitable market variety. In some cases it seems disposed to shed its leaves prematurely—a serious defect.

Beurré Diel.—Origin Belgium. Large, obtuse, pyriform; skin rather rough, rich yellow when fully and well ripened, some russet; flesh yellowish white, a little coarse-grained, buttery, sugary, half-melting, delicious.—Early to late Autumn. Tree very vigorous, and an abundant bearer; on young trees the fruit is sometimes not first-rate, but with age it assumes its true character, and is one of the most profitable market sorts. In Western New York and some other localities, it has suffered in some seasons from the black rust on the fruit, and blighting “scalding” of the foliage.

Beurré Hardy.—Large, obtuse, pyriform; greenish,

covered with light russet, and shaded one side with brownish red; flesh melting, buttery, juicy, brisk, vinous, slightly astringent, perfumed.—Early Autumn. Tree a strong grower, with erect habit and ample foliage, very productive; a beautiful and delicious fruit, worthy of more general cultivation.

Beurré Superfin.—Origin France. Medium size, roundish, pyriform; yellow, with bright red in the sun, and some russet; flesh buttery, very juicy, melting, vinous, sub-acid.—Mid-Autumn. Tree hardy, a moderately vigorous grower, not an early but a good bearer when at maturity; in quality it is among the best.

Buffum.—Origin Rhode Island. Medium size, obovate, oblong; deep yellow, when fully ripe, with red covering nearly one side, sometimes a little russet; flesh white, sweet, moderately juicy, buttery, pleasant.—Early Autumn. Tree a strong, upright grower, forming a beautiful, compact head, a regular and productive bearer, hardy, and valuable for the orchard. Tree remarkable for its upright, symmetrical, and vigorous growth.

Coit's Beurré.—Origin Ohio. Medium, obtuse, pyriform; yellow, slightly russet, often a red cheek; flesh white, melting, juicy, rich, vinous.—Early Autumn. Tree a healthy, good grower, an early, good bearer; makes a fine, round, half-compact head.

De Tongres (DURANDEAU).—Origin France. Large, long, pyriform; pale yellow, with cinnamon russet, which becomes red on sun side; flesh melting, juicy, vinous, sugary, rich.—Mid-Autumn. Tree moderately vigorous, an early and abundant bearer; a large, handsome fruit, but somewhat variable in quality.

Dix.—Origin Massachusetts. Large, long, pyriform; deep yellow, with more or less of russet; flesh juicy, sugary, melting, slightly perfumed.—Mid to late Autumn. Tree hardy, vigorous, a tardy bearer, but productive when

mature; a fine and profitable orchard sort, only for the serious drawback of tardy bearing, on account of which it is now seldom planted.

Doctor Reeder.—Origin New York. Small to medium size, roundish, slightly pyriform; yellow, mostly covered with nettings of russet and russet dots; flesh fine, melting, juicy, buttery, sugary, vinous, slightly musky.—Late Autumn. Tree a healthy, hardy, vigorous, open, spreading grower, productive; comparatively a new variety of great promise; a delicious fruit, valuable for the amateur; not large nor showy enough for market.

Doyenné Boussock (BEURRÉ BOUSSOCK, etc.).—Origin Belgium. Large, varying in form, usually roundish, or obtuse pyriform; deep yellow, clouded with russet, bronzed red cheek in the sun.—Early Autumn. Tree very vigorous, upright, spreading; an early, abundant bearer; profitable for market.

Doyenné du Comice.—Origin France. Large, broad, obtuse pyriform; greenish yellow, clear yellow at maturity, some russet; flesh white, melting, juicy, sweet, rich, slightly aromatic.—Late Autumn. Tree moderately vigorous, upright, productive; comparatively new and of the highest promise.

Doyenné Gray.—Medium size, obovate; dull yellow, mostly covered with smooth cinnamon russet; flesh very buttery, fine-grained, rich, delicious.—Mid-Autumn. Tree a moderate, healthy grower, a good bearer; very valuable for orchard or garden; by many esteemed superior to White Doyenné. In some localities, as in Western New York, both these varieties are often rendered worthless by black rust and cracking:

Doyenné White (BUTTER PEAR, VIRGALIEU, and thirty more synonyms).—Medium to large, obovate; when fully ripe, pale yellow, often with a fine, red cheek; flesh white, fine-grained, melting, very buttery, rich, delicious.—Early

to late Autumn. Tree a healthy, vigorous grower, hardy, productive; unreliable East and in Western New York, but in the new, rich soils West, one of the best. Twenty years ago this was regarded as the best of all pears; now it is an outcast in many localities.

Duchesse d'Angouleme.—Origin France. Large to very large, oblong, obovate; dull greenish yellow, with more or less of russet spots and streaks; flesh white, buttery, juicy, excellent.—Mid-Autumn. Tree a very vigorous grower, the most successful on the quince, productive and very profitable; has gained much in popularity in a few years, because better understood. Is now regarded as one of the most valuable varieties cultivated; it is next to Bartlett in popularity among the market-growers all over the country.

Emile d'Heyst.—Origin Belgium. Large, oblong, pyriform; clear yellow, with a brownish cheek in the sun, netted and patched with russet; flesh yellowish white, juicy, fine-grained, melting, sweet, aromatic, excellent.—Early Winter. Tree a vigorous, spreading grower, holding its foliage late in autumn, very productive; taking rank as a valuable early winter sort.

Flemish Beauty (**BELLE DE FLANDERS**, and twenty more synonyms).—Large, roundish, pyriform; yellow, mostly covered with marblings and patches of light russet, brownish red in the sun; flesh yellowish white, juicy, melting, sweet, rich, slightly musky.—Early Autumn. Tree hardy, vigorous, an early and abundant bearer, and highly valued West for orchard or garden; sometimes seriously attacked with black fungus or rust, and cracking in New York and Eastern States.

Fulton.—Origin Maine. Below medium size, roundish, flattened; gray russet, becoming at maturity dark cinnamon russet; flesh moderately juicy, half-buttery, sprightly, agreeable.—Mid to late Autumn. Tree a moderate

but healthy grower, hardy, and productive; valuable for the orchard.

Howell.—Origin Connecticut. Rather large, roundish, pyriform; light yellow, with a clear, red cheek; flesh whitish, juicy, melting, vinous.—Early and mid Autumn. Tree an upright, vigorous grower, an early and abundant bearer; one of the most beautiful and excellent of pears, and promising to be of great value over a large extent of country; beginning to be much planted for market the fruit bears carriage well.

Jones (JONES'S SEEDLING).—Origin Pennsylvania. Medium or below in size, roundish, pyriform; yellow, shaded with russet, bright cinnamon russet in the sun; flesh rather coarse, granular, buttery, sugary, vinous.—Middle to late Autumn. Tree a vigorous, upright grower, and productive; a fine little pear for the amateur's collection.

Kirtland.—Origin Ohio. Medium, roundish, obovate; rich yellow, much covered with cinnamon russet, and red on sun side; flesh juicy, melting, sweet, aromatic.—Early Autumn. Tree moderately vigorous, stocky, healthy, and productive.

Louise Bonne de Jersey.—Origin France. Large, long pyriform; greenish yellow, mostly overspread with brownish red, and a red cheek in sun; flesh melting, very juicy, rich, vinous, excellent.—Early Autumn. Tree a rapid, upright grower, and abundant bearer; one of the very best on quince; a profitable market pear where it succeeds.

Merriam.—Origin Massachusetts. Medium, roundish; dull yellow, with more or less of russet; flesh yellowish, rather coarse, melting, juicy, slightly vinous, musky.—Mid-Autumn. Tree vigorous, very productive; an exceedingly profitable orchard sort, but little grown out of Massachusetts.

Maréchal de la Cour (CONSEILLER DE LA COUR, etc.).—

Origin Belgium. Medium to large size, pyriform; greenish yellow, with more or less russet; flesh yellowish white, melting, buttery, juicy, rich, vinous.—Mid-Autumn. Tree moderately vigorous, holds its foliage late in season, a good bearer.

Onondaga (SWAN'S ORANGE).—This pear was first introduced by the late General Swan, of Rochester, N. Y., under the name of "Swan's Orange," from Clinton, N. Y., but it was supposed to be traced to Connecticut. Fruit large, obtuse, pyriform, surface rather uneven; skin orange yellow at maturity, with traces of russet in some localities, rarely a red cheek; flesh melting, rather coarse, juicy, vinous, sometimes slightly astringent, a little variable but generally excellent. Tree a strong grower, hardy, and very productive.

Paradise d'Automne.—Origin Belgium. Large, long pyriform; yellow, mostly covered with cinnamon russet; flesh often slightly granular, melting, juicy, with a rich, vinous, aromatic flavor.—Early to mid Autumn. Tree a vigorous, rather irregular grower, an early, good bearer; fine for the garden, not suited to orchard.

Pratt.—Origin Rhode Island. Medium, roundish, pyriform; greenish lemon-yellow, shaded with red in the sun; flesh juicy, sugary, melting, briskly vinous.—Early Autumn. Tree an upright grower, very productive.

St. Michael Archangel.—Origin France. Large, obovate, pyriform; pale yellow, netted and patched with russet; flesh buttery, juicy, melting, slightly aromatic.—Mid-Autumn. Tree a vigorous, symmetrical, upright grower, productive; a beautiful fruit, but variable in quality, generally excellent.

Seckel.—Origin Pennsylvania. Small, roundish, ovate; dull yellow brown, with a russet red cheek; flesh buttery, very juicy, rich, spicy, aromatic.—Early Autumn. Tree a slow but healthy, hardy grower, upright, forming a

small, compact head; successful and well known everywhere. Although it takes a little more time to bring this variety into profitable bearing condition, yet it is a reliable and permanently valuable sort for orchard or garden.

Sheldon.—Origin New York. Medium, roundish; greenish yellow, a thin, light russet and a bright red or crimson in the sun; flesh very juicy, melting, vinous, sweet, aromatic. Tree hardy, a vigorous, upright grower, forming a handsome, round head, a good bearer. This noble fruit, like some other varieties, is often condemned as rotting at the core, but it only requires to be gathered early and used when ripe, like Flemish Beauty, Clapp's Favorite, Beurré Giffard, and others.

Souvenir d'Esperen.—Origin France. Medium to large, long pyriform; greenish yellow, mostly covered with russet; flesh yellowish, juicy, vinous, aromatic.—Mid to late Autumn. Tree vigorous, healthy, and hardy, holds its foliage late in the season, productive.

Stevens' Genesee.—Origin New York. Large, roundish; yellow; flesh half-buttery, rich, aromatic flavor.—Early Autumn. Tree a healthy, good grower, and productive. It is not as popular as formerly in Western New York, but West, and especially in light soils, it is one of the profitable sorts; needs to be gathered early and used as soon as ripe.

Urbaniste (BEURRÉ PICQUERY, etc.).—Medium to large size, roundish, pyriform; pale yellow, with some russet; flesh very melting, buttery, juicy, rich, and delicately perfumed.—Early and mid Autumn. Tree a moderate, vigorous, compact, pyramidal grower, very hardy, not an early bearer, but an abundant one at maturity; very valuable and profitable for the orchard.

Washington.—Origin Delaware. Medium size, oval; clear, lemon yellow, with some red in sun and reddish

dots; flesh very juicy, sweet, melting, agreeable.—Early Autumn. Tree a slender but healthy and vigorous grower, and a good bearer; this is one of our native pears that has been too much overlooked; a very beautiful and excellent variety for the amateur's collection.

CLASS III.—WINTER PEARS.

Beurré Easter (DOYENNÉ D'HIVER, and a dozen or more other synonyms). Large, roundish, oval; yellowish, more or less of russet in dots, which sometimes gives it a brownish cheek; flesh fine-grained, very buttery, melting, and juicy, sweet, and rich.—Very late Winter, we have often kept it until April. The tree is a moderate grower, making a compact, upright, round head, bearing abundantly. It is one of the best sorts for the South and South-west, but requires warm exposure when grown North and East. Everywhere it requires good, rich soil, good culture, and careful thinning of the fruit to bring it to perfection.

Beurré Gris d'Hiver Nouveau.—Medium to large, roundish, obtuse; rich yellow russet, with a fine, sunny cheek of dark red; flesh slightly granular, buttery, melting, rich, sugary.—Early to mid Winter. Tree a moderately vigorous grower, somewhat irregular, good bearer; a noble fruit, worthy of careful treatment.

Beurré d'Aremberg (DUC D'AREMBERG, etc.).—Origin France. Medium to large, obovate, uneven surface; greenish yellow, yellow at maturity with some russet; flesh white, buttery, juicy, rich, vinous.—Early Winter. Tree a slow grower and unhealthy; a delicious winter pear, but seldom planted, on account of its serious defects.

Catillac.—Large, or very large, broad, turbinate; yellowish, with a brown cheek; flesh firm.—Early to late Winter. Tree a strong grower and good bearer, best in

rich soil, and valued as a baking or cooking pear, and for confectionary purposes.

Columbia.—Origin New York. Large, obovate; pale green in autumn, becoming golden yellow at maturity, with deep orange cheek in sun exposure; flesh juicy, sweet, aromatic.—Early Winter. Tree an upright, handsome grower, and a good bearer. Fruit liable to be blown off, needs watching.

Dana's Hovey.—Origin Massachusetts. Small, obovate, pyriform; pale yellow, netted and patched with russet; flesh yellowish, melting, juicy, rich, sugary, aromatic.—Early Winter. Tree a healthy, vigorous grower, hardy, and productive; a high-flavored, delicious pear for the garden; too small for profitable market growing, though it commands high prices where known, like the Seckel.

Doyenné d'Alençon (DOYENNÉ D'HIVER, D'ALENÇON, etc.).—Medium, roundish, slightly pyriform; yellow, shaded in sun with dark crimson, considerable russet; flesh granular, buttery, juicy, sugary, sprightly, perfumed.—Middle to late Winter, often keeping until spring. Tree moderately vigorous and productive; a valuable pear, like the Easter Beurré, though not in same degree; needs high culture and thinning of the fruit to bring it to perfection; tree more hardy than Easter Beurré.

Glout Morceau.—Flemish origin. Rather large, often very large, varying in form, usually short, pyriform; greenish yellow, with patches and dots of greenish brown; flesh white, fine-grained, buttery, melting, rich, sugary.—Early Winter. Tree is of a roundish, spreading habit, very healthy and hardy, not an early bearer, but when mature produces an abundant crop, regular and uniform. It is distinct in wood and foliage from other varieties, and forms one of the handsomest of pyramids on quince roots. In localities where the pear blight prevails it seems pecu-

liarily liable to attack, and recently has not been much planted.

Josephine de Malines.—Medium size, roundish, flattened; pale yellow or straw color at maturity, sometimes netted and patched with russet; flesh white, tinted with rose, juicy, melting, sweet, slight aroma.—Mid-Winter, often keeps until Spring. Tree a moderate grower, hardy, foliage small, quite productive; a very valuable late pear, and rapidly gaining in popularity.

Lawrence.—Origin Long Island. Medium or above in size, obovate, obtuse pyriform; clear, light yellow, with more or less of russet; flesh juicy, melting, sweet, aromatic.—Early Winter. Tree a moderate grower, healthy, and a good bearer; valuable both for garden and orchard. It usually commands the highest price in market; one of the most valuable early winter sorts.

Uvedale's St. Germain (POUND, and over thirty other synonyms).—Large, pyriform; yellowish green; flesh firm, excellent for baking or stewing.—Early to late Winter. Tree a strong, healthy grower, very productive; valued everywhere for cooking or preserving.

Vicar of Winkfield (LA CURÉ, and two dozen more synonyms). Origin France. Large, long pyriform; pale yellow at maturity, often, when well grown, with a brownish red cheek; flesh moderately juicy, half-buttery, sprightly and good.—Early to mid or late Winter. Tree a healthy, vigorous grower, and very productive; this is one of the most profitable as an orchard sort among the whole list of pears, but needs to be well grown to be good; trees are apt to be overladen and should be thinned.

Winter Nelis (BONNE DE MALINES, etc.).—Medium size, or below, roundish, obovate; yellowish green, patched and marbled with considerable russet; flesh fine-grained, buttery, very juicy, sugary, aromatic.—Early Winter.

Tree thrifty, hardy, rather slender and somewhat irregular grower, an early and regularly abundant bearer; valuable for the garden or amateur culture, but not profitable in the orchard. The crop usually needs thinning, especially on trees of considerable age; fruit is always inferior when the tree is overloaded, but this applies to nearly all varieties, though not in the same degree.

CLASS IV.

Varieties of pears scarcely entitled to a place on the select list, and too good to be omitted. Some are very popular and valuable in certain localities; others are new, or comparatively new, and promising. This list might have been greatly extended.

Abbott.—Medium, pyriform; yellowish, shaded with red; white, granular, juicy, buttery, melting.—September. Rhode Island.

Adams.—Large, obovate, pyriform; greenish yellow, russet and red cheek; very juicy, melting, vinous.—September. Massachusetts.

Andrews.—Rather large, pyriform; yellowish green, with a dull red cheek; juicy, melting, fine, vinous flavor.—September. Massachusetts.

André Desportes.—Medium, roundish, pyriform; greenish yellow, bronzed in sun; melting, fine, juicy, sugary.—July. France—*new*.

Beurré d'Amanlis.—Large, roundish; dull yellow green, reddish brown cheek; flesh yellowish, coarse, buttery, melting; unreliable in quality, good old market sort.—September.

Beurré d'Angleterre.—Medium, pyriform; dull green, netted with russet; buttery, melting, juicy, pleasant.—September. France. *New*.

Beurré d'Albret.—Medium, long pyriform; yellow,

with cinnamon russet; very juicy, buttery, melting, vinous.—October. An excellent fruit.

Beurré Brown.—Large, obovate, oblong; yellowish green, with reddish brown and russet; flesh white, melting, buttery, extremely juicy, sub-acid.—September. France. A fine old sort, often excellent, but too variable.

Beurré Durand.—Medium, oblong, pyriform; yellow, with splashes of red in the sun; fine, melting, sugary, vinous.—September. France.

Beurré Golden of Bilboa.—Medium, obovate, pyriform; yellow, slight russet; very buttery, melting, fine-grained, vinous.—September. Spain.

Beurré Mauxien.—Medium, roundish, pyriform; yellow russet, with a red cheek; fine, buttery, melting, juicy, sugary, vinous, perfumed.—September. Belgium.

Beurré del'Assomption.—Large, short pyriform; lemon yellow, some russet; fine, melting, juicy, vinous, perfumed.—August. France. Tree a vigorous grower; a promising new sort.

Beurré Moire.—Large, oblong, pyriform; greenish yellow, tinge of red in sun; granular, buttery, melting, fine, rich, perfumed. October. France.

Bergamotte d'Esperén.—Origin France. Medium size, roundish, flattened, or flat; skin thick, rough; greenish yellow, russet patches; flesh greenish yellow, sweet, juicy, rich. Tree healthy, vigorous, and productive.

Bezi Esperen.—Large, roundish, pyriform; dull yellow, some russet; juicy, sprightly, vinous.—October. France.

Bezi de Montigny (COMPTESSE DE LUNAY, etc.).—Medium size, roundish, obovate; yellowish green; flesh melting, half-buttery, juicy, sweet, musky.—Mid-Autumn. Tree vigorous, healthy, productive.

Black Worcester.—Large, pyriform; green, nearly covered with russet, coarse; valued for cooking.—Winter.

Bonne Sophia.—Medium, acute, pyriform; pale yellow, shade of crimson, nettings of russet; juicy, fine, melting, sweet, perfumed.—October. France. New and promising.

Bonne de Puits d'Ansault.—Medium, roundish; bronzed yellow; slightly gritty, melting, juicy, sugary, musky, agreeable, of fine quality.—September. France.

Caen de France.—Medium, short pyriform; yellow, with dull russet; fine-grained, juicy, melting, vinous, aromatic.—December, February. France. A variety of great excellence.

Church.—Below medium, flattened; greenish yellow; very buttery, melting, rich, sweet, perfumed.—September.

Comte de Flandre.—Large, long, pyriform; yellowish russet; very buttery, melting, juicy, rich, sweet.—October. Belgium.

Doctor Lindley.—Medium, obovate, pyriform; yellow, with slight russet; melting, sweet, perfumed.—November, December.—France. New and promising.

Duchess d'Orleans (ST. NICHOLAS, etc.).—Origin France. Above medium size, long, pyriform; yellowish green, with sometimes a red cheek; flesh melting, juicy, slightly aromatic.—Early Autumn. Tree an upright, moderate grower, and a good bearer; a handsome and excellent amateur sort.

Duchess Precocce.—Large, pyriform; greenish yellow, becoming clear yellow; melting, juicy, sprightly, although not rich.—September. France. New and promising.

Duc de Brabant (B. DE WATERLOO, FONDANTE DES CHARNEUSE).—Origin Belgium. Large, pyriform; greenish, with crimson red in the sun; flesh very juicy, buttery, melting, vinous.—Mid to late Autumn. Tree vigorous, hardy, and productive.

Duchesse de Bordeaux.—Medium, roundish, pyriform; yellow, with considerable russet; moderately juicy, sweet, pleasant, scarcely melting.—January. France.

Edmonds.—Origin Monroe County, N. Y. Large, roundish, pyriform, with a very long stalk; yellow, or straw color, with occasionally bronzed red in the sun; flesh fine-grained, buttery, melting, sweet, with a peculiar and very agreeable aroma; quality variable, especially on young trees.—Early Autumn. Tree a remarkably strong, upright grower, and an abundant bearer.

General Tottleben.—Medium to large, obtuse, pyriform; greenish yellow, patched with russet; whitish yellow, a little coarse, melting, juicy, slightly aromatic.—October. Belgium.

General Taylor (Homewood).—Medium, obtuse, pyriform; yellow, crimson in sun, nettings and patches of russet; a little coarse, juicy, melting, sweet.—October. Maryland.

Gratioli of Jersey.—Medium, roundish, pyriform; greenish yellow, netted and patched with russet; juicy, rich, melting, vinous.—September. Isle of Jersey.

Henry the Fourth.—Below medium, roundish, pyriform; greenish yellow, with gray specks; not fine-grained, juicy, melting, perfumed.—September. France. An old variety.

Henri Desportes.—Large, pyriform; yellowish green; juicy, melting, sweet. August. Tree a moderate grower.—France. New.

Jalousie de Fontenay Vendée.—Origin France. Medium size, long, pyriform; dull yellow and green, a red cheek and some russet; flesh white, melting, buttery, rich.—Mid-Autumn. Tree a vigorous grower and early and abundant bearer.

Jules Bivort.—Medium to large, pyriform; yellowish, with more or less russet; very juicy, buttery, sweet, melting, vinous.—October.

Kingsessing.—Large, obtuse, pyriform; greenish yellow; rather coarse, juicy, buttery, melting, sweet.—September. Pennsylvania.

Livingston Virgalieu.—Medium, roundish; greenish yellow; whitish, juicy, sweet, pleasant.—September. Pennsylvania.

Madam Eliza.—Large, acute, pyriform; light yellow, traces of russet; fine, juicy, melting, sweet, perfumed.—October. Tree a good grower. Belgium.

Maurice Desportes.—Medium to large, acute pyriform; dull yellow, with russet; fine-grained, melting, sweet.—October. Tree a vigorous grower and productive. France. New.

Marie Louise.—Large, long pyriform; yellow, mottled with russet; very buttery, melting, vinous, sweet.—October. Belgium. A fine, old sort, but variable in some localities.

Marie Louise d'Uccles.—Above medium, roundish, pyriform; yellow, shaded with brown in sun, netted and patched with russet; juicy, melting, vinous, a little astringent.—September. Belgium. New.

Mount Vernon.—Medium or above, roundish, pyriform; russet on yellow, brown red in sun; granulated, juicy, melting, slightly vinous, peculiar flavor.—November. Massachusetts. A promising, new American sort.

Nantais (BEURRE DE NANTES).—Large, long, pyriform; greenish yellow, with a red cheek; melting, juicy, sweet, pleasantly perfumed.—October. France.

Nouveau Poiteau.—Origin Belgium. Large, pyriform; greenish, with patches and dots of russet; flesh whitish, buttery, melting, juicy, sugary, vinous.—Late Autumn. Tree a very vigorous, upright grower, and productive; a beautiful tree and a noble fruit, but quality variable, often pasty and insipid.

Oswego Beurré.—Origin New York. Medium, roundish, flattened; yellowish green, with thin russet until fully ripe, then fine, yellow russet; flesh melting, buttery, juicy, vinous, aromatic.—Mid to late Autumn. Tree erect, moderately vigorous, and a great bearer even when young, sometimes cracks.

Ott.—Small, roundish; light yellow; melting, sugary, aromatic.—August. Pennsylvania.

Platt.—Medium, roundish, flattened; pale yellow, considerable russet; buttery, juicy, half-melting, pleasant.—October. New York.

Petite Marguerite.—Medium, obovate; greenish yellow; sweet, juicy, vinous.—August. France. New and promising.

Pitmaston Duchess.—Large, pyriform; yellow, with patches of cinnamon russet; melting, juicy, rich, delicate perfume.—October and November. New and promising.

Pius the 9th.—Above medium, roundish, long, pyriform; yellow, considerable russet; juicy, a little firm, melting, brisk, vinous. October. Belgium. Variable.

Rapelje's Seedling.—Medium, obovate to pyriform; yellowish, mostly covered with gray russet; juicy, somewhat granular, melting, sweet, vinous.—September. Long Island. An excellent fruit.

Rutter.—Medium to large, roundish; greenish yellow, considerable russet; moderately juicy, a little gritty, almost melting, sweet.—October. Pennsylvania. New and promising.

St. Ghislain.—Medium, pyriform; clear, pale yellow; buttery, juicy, sprightly, rich.—October. Belgium. A fine, old sort, but rather superseded by others of same season larger and more attractive.

Souvenir du Congres.—Large; beautiful yellow, with

bright red in the sun; melting, juicy, musky.—September. France. New and highly commended abroad.

Williams d'Hiver.—Large, pyriform; greenish yellow, firm; moderately juicy, vinous, slightly sweet.—January. France. This purports to be a winter Bartlett, and has been highly commended.

SELECT ASSORTMENTS OF PEARS.

To aid the inexperienced amateur in making up small assortments:

TWELVE VARIETIES ON PEAR STOCKS.—Bartlett, Clapp's Favorite, Doyenné d'Été, Beurré Bosc, Lawrence, Beurré d'Anjou, Seckel, Winter Nelis, Dana's Hovey, Sheldon, Paradise d'Automne, Doyenné Boussock.

TWELVE VARIETIES ON QUINCE STOCKS.—Beurré d'Anjou, Duchess d'Angoulême, Louise Bonne de Jersey, Howell, Urbaniste, White Doyenné (where it succeeds), Vicar of Winkfield, Doyenné d'Alençon, Brandywine, Tyson, Rostiezer, Josephine de Malines.

TWENTY-FIVE VARIETIES FOR THE GARDEN ON QUINCE.—Bartlett, Rostiezer, Tyson, Beurré d'Anjou, Beurré Diel, Belle Lucrative, Beurré d'Amanlis, Duchess d'Angoulême, Doyenné White (where it succeeds), Doyenné Gray, Louise Bonne de Jersey, Seckel, Onondaga, Urbaniste, Beurré Easter, Beurré Gris d'Hiver, Glout Morceau, Vicar of Winkfield, Josephine de Malines, Uvedale's St. Germain, Beurré Superfin, Beurré Hardy, Howell, Brandywine, Doyenné d'Alençon.

FOR PROFIT ON QUINCE STOCK.—Duchess d'Angoulême, Louise Bonne de Jersey, Beurré d'Anjou, Howell, and White Doyenné where it succeeds.

SECTION 3.—QUINCES.

Apple-Shaped or Orange.—Large, roundish, with a short neck; of a bright golden yellow color; tree has rather slender shoots and oval leaves; very productive. This is the variety most extensively cultivated for the fruit.—Ripe in October.

Pear-Shaped.—This has generally more of a pyriform shape than the preceding; the fruit is larger, the tree stronger.

Portugal.—The fruit of this is more oblong than the preceding, of a lighter color and better quality; the shoots are stouter, and the leaves thicker and broader; usually propagated by budding or grafting. A week or two later than the Apple. A shy bearer.

Angers.—The strongest grower of all the quinces, and the best for pear stocks. The fruit is much like the orange in appearance; later, keeps longer. The tree does not bear as young, but when once it reaches maturity is a good, regular bearer.

Rea's Seedling (REA'S MAMMOTH, VAN SLYKE). Native of Greene County, N. Y.—A magnificent fruit, averaging much larger than the Apple-shaped or Orange, resembles it in appearance, and by some preferred for culinary purposes.

Chinese.—Usually cultivated for ornament. Quite different in appearance from the others. The leaves are glossy, sharply and beautifully toothed; the fruit is large, oblong, bright yellow, and keeps until spring; little used. The flowers are large and showy, with the fragrance of the violet; worked on the other sorts; rather tender, requiring a sheltered situation. A very tardy bearer.

Japan.—This is very distinct from all the others; very bushy, thorny, and hardy. There are several varieties, all of which may be reckoned among the most beautiful

of all our hardy spring flowering shrubs. Fruit about as large as a chicken's egg; unfit for use.

SECOND DIVISION.—STONE FRUITS—APRICOTS, CHERRIES, PEACHES, NECTARINES, AND PLUMS.

SECTION 4.—SELECT APRICOTS.

Alberge de Montgamet (MONTGAMET).—Medium size; pale yellow, with tinge of red in the sun; flesh yellowish, adhering to the stone; juicy, perfumed, excellent. The tree is a hardy, fine grower.—Last of July.

Beauge.—Resembles Moorpark, but ripens later.

Blenheim (SHIPLEY).—Medium size, oval; orange yellow; flesh juicy, moderately rich.—Ripens eight or ten days before Moorpark.

Breda.—Small, round, dull orange, marked with red in the sun, flesh orange-colored, juicy, rich and vinous; parts from the stone, kernel sweet, tree hardy, robust, and prolific.—End of July and beginning of August.

Canino Grosso.—Large; orange color, becoming red in the sun; flesh reddish yellow, high-flavored.—Middle of July. Tree vigorous, hardy.

Early Golden (DUBOIS).—Small; pale orange; flesh orange, juicy and sweet; kernel sweet; tree very hardy and productive. The original tree at Fishkill is said to have yielded \$90 worth of fruit in one season.—Beginning of July.

Early Moorpark.—Resembles Moorpark, but ripens earlier. Medium size, roundish, oval; yellow, mottled with crimson in the sun.

Hemskirke.—A large English variety, much like Moorpark, but ripens a little earlier. It is known by its stone not being perforated, as is that of the Moorpark.

Kaisha.—A variety from Syria; requires a warm, sheltered location; medium size, roundish; yellow, mottled and tinged with red in the sun; flesh tender, sugary, high-flavored; separating freely from the stone.—Last of July.

Large Early.—Large; orange, with a red cheek; flesh sweet, rich and excellent; parts from the stone; tree vigorous and productive.—Beginning of August.

Moorpark.—One of the largest and finest apricots; yellow, with a red cheek; flesh orange, sweet, juicy and rich; parts from the stone; growth rather slow, but stout and short-jointed; very productive.

Orange.—Medium size; orange, with a ruddy cheek; flesh rather dry, requires ripening in the house; adheres slightly to the stone.—End of July.

Peach.—A very large, handsome, and excellent variety, quite similar to the Moorpark; the shoots are not so short-jointed, and the fruit a degree larger.

Red Masculine (EARLY MASCULINE, etc.).—Small, nearly round; well-marked suture one side; bright yellow, tinged with deep orange, and spotted with dark red; flesh juicy, musky, pleasant; the earliest to ripen.—Early in July. Tree hardy and a good bearer.

Saint Ambroise.—Large; deep yellow, reddish next the sun; flesh juicy, rich and sweet.—Middle of August.

Sardinian.—Small; white, with a red cheek; moderately juicy.—Very early in July. Tree productive.

Turkey.—Medium to large, nearly round; deep yellow, mottled with orange in sun; flesh pale yellow, firm, juicy, excellent.—Middle August.

SECTION 5.—SELECT CHERRIES.

CLASS I.—HEART CHERRIES.

Fruit heart-shaped, with tender, sweet flesh. Trees of rapid growth, with large, soft-drooping leaves.

Belle d'Orleans.—Origin France. Medium size, roundish, heart-shape; pale yellow, partially covered with red; flesh very tender, juicy, sweet and delicious.—Early in June, or immediately after Early Purple Guigne. Tree a fine grower and an abundant bearer; one of the finest early varieties.

Black Eagle.—Origin England. Rather above medium size, obtuse, heart-shape; deep purplish black; flesh deep purple, tender, with a rich, high-flavored juice.—Early in July, or just after Black Tartarian. Tree a strong grower, a moderate bearer while young, productive when old.

Black Tartarian.—Origin Russia. Very large, heart-shape, uneven on the surface; purplish black; flesh half-tender, very juicy, mild, delicious.—Last of June. Tree very vigorous, upright, very productive; one of the most popular and productive varieties in all parts of the country; always commands the highest price in market.

Coe's Transparent.—Origin Connecticut. Medium size, round; skin glossy, pale amber, mottled and spotted with carnelian red; flesh very tender, juicy, sweet and delicate.—Middle to last of June. Tree a vigorous grower, forming a handsome, round head, very productive; this is one of the best of dessert cherries, but too tender for marketing.

Delicate.—Origin Ohio. Rather above medium, roundish; clear amber yellow, with a rich, bright red in sun exposure; flesh very tender, juicy, sweet, with a rich, high flavor.—Last of June. Tree a thrifty, spreading grower, productive; most valuable for family use.

Downer's Late Red.—Origin Massachusetts. Medium, roundish; clear, lively red, mottled with amber; flesh tender, juicy, sprightly, a little bitter unless fully ripe, when it is sweet and fine.—Early to middle July. Tree very hardy, a fine, erect grower, very productive; the fruit is borne in clusters, and will hang for a considerable time on the tree.

Early Purple Guigne.—Medium size, roundish, heart-shape; dark red, purplish when mature; flesh purple, juicy, tender, rich and sweet.—Early in June. Tree a free but slender grower while young, hardy, and makes a fine, spreading, open head, bearing very abundantly; it is indispensable as an early variety, and is found highly profitable as a market sort in some localities.

Elton.—Origin England. Large, heart-shape, pointed; glossy pale yellow, shaded, mottled and streaked with red in the sun; flesh somewhat firm, nearly tender when fully ripe, juicy, sweet, rich, high flavor.—Middle to last of June. Tree vigorous, spreading, irregular in growth, a good bearer; one of the best of the large, light-colored cherries.

Governor Wood.—Origin Ohio. Large, roundish, heart-shape; light, rich yellow, shaded and marbled with red; flesh almost tender, juicy, sweet, with a rich, delicious flavor.—Middle to last of June. Tree a fine grower, forming a round, half-spreading head, very productive; liable to overbear, which might be remedied by judicious pruning.

Knight's Early Black.—Origin England. Large, heart-shape; deep purple, almost black; flesh purple, tender, juicy, sweet and rich, high flavor.—Middle to last of June. Tree a spreading, stocky grower, and productive.

Ohio Beauty.—Origin Ohio. Large, obtuse, heart-shape; pale yellow, mostly overspread with clear, bright red; flesh quite tender, juicy, brisk, delicious.—Middle

of June. Tree a vigorous, rather spreading grower, very productive, and hardy; ranks among the best of the light-colored varieties.

Wilkinson.—Medium, heart-shape; deep red, almost purplish black; flesh purplish, tender, juicy, pleasant.—Middle July. Tree vigorous, upright, productive; valued because of late ripening.

CLASS II.—BIGARREAU CHERRIES.

These are chiefly distinguished from the preceding class by their firmer flesh. Their growth is vigorous, branches spreading, and foliage luxuriant, soft, and drooping.

Bigarreau or Yellow Spanish.—Large, obtuse, heart-shape; beautiful waxen yellow, with bright red cheek in the sun; flesh quite firm, pale yellow, juicy, rich, sweet and delicious flavor.—Last of June. Tree a vigorous, stocky grower, making a fine, round head, very productive; an old variety of the largest size and best quality.

Buttner's Yellow.—Origin Germany. Medium size, roundish; pale yellow; flesh crisp, juicy, sweet. Last of July. Tree a vigorous grower, moderately productive; the peculiar color of this cherry makes it attractive.

Cleveland Bigarreau.—Origin Ohio. Large, round, heart-shape; bright, clear red on yellow; flesh half-firm, juicy, sweet and rich.—Last of June. Tree a fine grower, spreading and productive.

Gridley or Apple Cherry.—Origin Massachusetts. Medium, roundish; dark reddish brown, black when fully ripe; flesh very firm, not juicy or high-flavored.—Middle July. Tree hardy, vigorous, and productive; a capital market variety because of its lateness and firmness.

Monstreuse de Mezel (GREAT BIGARREAU).—Origin France. Large or very large, obtuse, heart-shape, uneven

surface; dark red, almost black at maturity; flesh firm, juicy, well-flavored.—Early to Middle July. Tree very vigorous, forming a large, wide, open, spreading head, productive and profitable.

Napoleon Bigarreau (“ROYAL ANN” in California and Oregon).—Very large, heart-shaped; pale yellow, dotted and spotted with deep red and dark crimson; flesh very firm, juicy, fine flavor.—Early July. Tree a vigorous grower and very productive.

Osceola.—Origin Ohio. Large, heart-shape; dark red, almost black; flesh juicy, tender, sweet, excellent.—Last of June. Tree a moderate, healthy grower, and a good bearer.

Pontiac.—Origin Ohio. Large, obtuse, heart-shape, sides compressed; dark purplish red, almost black when fully ripe; flesh half-tender, juicy, sweet, rich, excellent.—Last of June. Tree vigorous, upright, round-headed, very productive; a valuable orchard or table sort.

Red Jacket.—Origin Ohio. Large to very large, regular, obtuse, heart-shape; amber yellow, mostly covered with light red; flesh half-tender, juicy, sweet, good flavor.—Middle July. Tree a free, healthy grower, forming a large, spreading head, very productive; ripens late, and is very profitable for market.

Rockport Bigarreau.—Origin Ohio. Large, roundish, obtuse, heart-shape; amber yellow, shaded and mostly covered with bright red; flesh half-tender, juicy, sweet, rich, excellent.—Middle of June. Tree a very erect, vigorous grower, forming a remarkably beautiful, upright head, and very productive.

Tradescant's Black Heart (ELKHORN).—Origin Europe. Very large, heart-shaped; deep purple, almost black; flesh firm, moderately juicy, purplish, sweet.—Middle to end of July. Tree vigorous, upright, with a

peculiar gray bark, a great bearer, and valuable for market or garden.

CLASS III.—DUKE AND MORELLO CHERRIES.

These two classes of cherries are very distinct from the preceding. The trees are of smaller size and grow slowly; the leaves are thicker and more erect, and of a deeper green. The fruit is generally round, and in color varying from light red, like *Belle de Choisy*, to dark brown, like *Mayduke* or *Morello*.

The Dukes have stout, erect branches usually, and some of them, like *Belle de Choisy* and *Reine Hortense*, quite sweet, whilst the Morellos have slender, spreading branches, and acid fruit invariably. These two classes are peculiarly appropriate for dwarfs and pyramids, on the Mahaleb stock, and their hardiness renders them well worthy of attention in localities where the Hearts and Bigarreaus are too tender.

Belle de Choisy.—Origin France. Medium size, round; skin thin, translucent; pale amber color, mottled with yellowish and bright carnelian red; flesh very tender, amber-colored, melting, juicy, sweet.—Last of June. Tree a healthy grower, makes a handsome pyramid on the Mahaleb, a regular but moderate bearer; an excellent dessert sort, valued for garden culture.

Belle Magnifique.—Large, roundish, bright, rich red; flesh juicy, tender, rich, rather acid until fully ripe, when it is fine for the table and excellent for cooking.—Last of July. Tree very hardy and healthy, a moderate grower, abundant bearer, fine as a dwarf or pyramid, on mahaleb.

Carnation.—Large, round; yellowish white, mottled and marbled with red; flesh tender, juicy, rich, a little acid unless fully ripe, when it is a rich, pleasant sub-acid. Middle to last of July. Tree a good grower, with a rather low, spreading habit; a moderate, regular bearer.

Donna Maria.—Medium size, roundish ; dark, clear red ; flesh tender, juicy, rich acid.—Middle July. Tree a healthy grower, hardy, forming a small, round-headed tree, that comes early into bearing and bears profusely ; a valuable and profitable variety for market or cooking.

Early Richmond.—Small to medium, roundish ; borne in pairs, and usually recognized by the calyx remaining on the stem next the fruit ; bright, clear red ; brisk, rich acid.—Early to last of June. Tree hardy, healthy, vigorous, forming a medium-sized tree, with long, half-pendent shoots, very productive, valuable and profitable.

Late Duke.—Large, heart-shape, flattened ; rich, clear, rather dark red ; flesh tender, juicy, sprightly sub-acid.—Ripens gradually and hangs a long time or until last of July. Tree a vigorous grower for its class, and a good bearer ; makes a fine dwarf or pyramid.

Louis Philippe.—Origin France. Large, roundish, regular ; dark, almost purplish-black red ; flesh red, tender, juicy, sprightly, mild acid, excellent.—Middle to last of July. Tree a vigorous grower, making a large tree for its class, with a handsome, round, spreading head, very productive ; a very valuable sort for dessert, canning, cooking, or market.

May Duke.—Large, roundish ; dark, lively, rich red ; flesh tender, very juicy, reddish, rich, and excellent sub-acid.—Middle of June. Tree hardy, vigorous, and productive, the fruit ripening gradually in succession ; makes fine dwarfs or pyramids.

Morello (English).—Large, roundish ; dark red, nearly black ; flesh dark purplish red, tender, juicy, sub-acid.—Late July. Tree a small, healthy, but slender grower, forming a pretty round head as a standard, and a fine bush as a dwarf.

Reine Hortense.—Origin France. Large to very large, roundish ; bright, clear red, marbled and mottled

in yellow ; flesh tender, juicy, slightly sub-acid, delicious.—Middle to last of July. Tree a healthy, vigorous, handsome grower, and a moderate, even, regular bearer.

Royal Duke.—Large, roundish, oblong ; rich, dark red at maturity ; flesh reddish, tender, juicy, sub-acid.—Last of June. Tree an upright, compact grower, with branches stouter than the average of its class, an even but moderate bearer.

SMALL SELECT LISTS.

Six for the Garden.—Rockport, Coe's Transparent, Black Tartarian, Black Hawk, Late Duke, and Louis Philippe.

For the Market Orchard.—Early Purple Guigne, Gridley, Napoleon, Red Jacket, Black Tartarian, Pontiac, Monstreuse de Mezel, Early Richmond.

SECTION 6.—SELECT NECTARINES.

The nectarine tree differs in nothing from a peach, and the fruit only in being smooth-skinned. It is peculiarly liable to be destroyed by the curculio. The same preventive remedy against curculio must be applied as with the plum.

Boston.—Origin Massachusetts. Fruit large, roundish, oval ; bright yellow, with a deep red and mottled cheek ; flesh yellow, sweet, pleasant, peculiar flavor.—Early in September. Freestone. Tree hardy and productive.

Downton.—Origin England. Large, roundish, oval ; pale green, with a violet, red cheek ; flesh greenish white, melting, juicy, sweet, rich and high flavored.—Last of August. Freestone.

Early Violet (VIOLETTE HÂTIVE).—Rather large, roundish ; pale yellow green, nearly covered with violet purple

red; flesh whitish, rays of red at stone, melting, juicy, rich and high flavor.—Last of August. Freestone.

Early Newington (LUCOMBE'S BLACK, etc.).—Origin England. Large, roundish, ovate, swollen point at apex; pale green, nearly covered, mottled and marbled with red, thin bloom; flesh greenish white, red at stone; juicy, sugary, rich, excellent.—Early September. Clingstone.

Elruge.—Origin England. Medium size, roundish, oval; greenish, mostly covered with violet red, deep red in the sun; flesh slightly stained with red at the stone, very juicy, melting, with a rich, fine flavor.—Early September. Freestone. This variety is widely grown and generally successful.

Hardwicke's Seedling.—Origin England. Fruit very large, roundish, or roundish oval, swollen point at apex; pale yellow, with a dark, violet red cheek; flesh pale green, tinged with red at the stone, juicy, melting, rich.—Last of August. Freestone. Tree very hardy and excellent bearer.

Hunt's Tawny.—Origin England. Fruit medium size; roundish, narrowing to the apex, swollen point, one side enlarged; pale orange, with a deep red cheek in the sun; flesh orange, melting, juicy, stained with red at stone.—Middle of August. Freestone. A hardy tree, early and productive.

Pitmaston Orange.—Origin England. Large, roundish, ovate, swollen point; rich orange yellow, red, bronzed in sun; flesh orange yellow, red at the stone, juicy, excellent.—Last August or early September. Freestone.

Red Roman.—Large, roundish, a little flattened; greenish yellow, with a brownish red cheek; flesh firm, greenish yellow, red at stone, juicy, rich, vinous.—Early September. Clingstone. Tree healthy and productive; an old, foreign variety of great value.

Rivers' Orange.—Originated by Thomas Rivers, England. Much like its parent, Pitmaston Orange, but ripening later. Tree a great bearer.

Stanwick.—Origin England, where it was grown from a stone brought from Syria. Large, or above medium, roundish oval; greenish white, much covered and shaded with violet red, when grown in the sun; flesh white, melting, rich, juicy, sweet.—Middle September. Comparatively a new sort, of great promise in the South, and suited to warm, sheltered locations.

Victoria.—Origin England. Fruit resembles Stanwick, except that it ripens a month earlier. It originated with Thomas Rivers, England, from seed of Early Violet, fertilized by Stanwick, and is as yet untested in this country.

NOTE.—Mr. Rivers has recently originated many new varieties of Nectarines, some of which promise to be valuable.

SECTION 7.—SELECT PEACHES.

Fl. s. DENOTES SMALL FLOWERS; gl. GLANDS; glob. GLOBOSE; AND ren. RENIFORM; f. FREESTONE; c. CLINGSTONE.

Bellegarde (EARLY ROYAL GEORGE, etc.).—Origin France. Gl. glob., fl. small. Fruit large, round, suture shallow; pale yellow green, with a rich, purplish red cheek; flesh marked with red at the stone, very melting, juicy, rich, and high flavored.—Last of August. F. An old variety, but one of the handsomest and best.

Bergen's Yellow.—American Origin. Gl. ren., fl. s. Fruit large, globular; deep orange, with red; flesh yellow, melting, juicy, rich, luscious.—Early September. F. A fine peach, but only an indifferent bearer.

Cole's Early Red.—American. Gl. glob., fl. s. Fruit medium size, roundish; pale yellow, nearly covered with

red ; flesh melting, juicy, rich, sprightly.—Middle August. A vigorous tree, hardy, abundant bearer, a profitable market sort.

Columbia (INDIAN PEACH).—American. Gl. ren., fl. s. Fruit medium to large, roundish, with distinct suture ; dull yellowish red, with streaks of dark red ; flesh yellow, rich, juicy, excellent.—September. F. A profitable market sort. Tree hardy, a good grower and bearer ; extensively grown both in orchard and garden.

Cooledge's Favorite.—American. Gl. glob., fl. s. Fruit large, roundish, slightly largest one side ; clear white, with a fine, crimson red cheek ; flesh very melting, juicy, rich, sweet, high flavor.—Middle August. F. Tree vigorous, healthy, very productive ; an extremely valuable, hardy, and profitable variety.

Crawford's Early.—American. Gl. glob., fl. s. Fruit very large, roundish, oblong, suture distinct, swollen point at apex ; yellow, with red cheek ; flesh yellow, melting, rich, sweet, excellent.—Early September. F. Tree very vigorous grower, abundant bearer, widely grown and highly esteemed either for orchard or garden.

Crawford's Late.—American. Gl. glob., fl. s. Fruit very large, roundish, with shallow suture ; yellow, with a fine, dark red cheek ; flesh deep yellow, red at the stone, juicy, melting, rich, vinous, excellent.—Middle to last of September. F. Tree vigorous, hardy, productive, highly valued for orchard or garden.

Druid Hill.—American. Gl. glob., fl. s. Fruit large, roundish, swollen point distinct ; greenish white, clouded with red in the sun ; flesh greenish white, purplish red at stone, very juicy, melting, rich, vinous.—Last of September, early October. F. Tree very vigorous, abundant bearer, and profitable South and South-west ; it does not always ripen well in this section.

Early Newington Freestone.—Gl. glob., fl. s. Fruit large or above medium, round, suture distinct; pale yellowish white, dotted and shaded with red in the sun; flesh white, red at stone, to which it partially adheres unless fully ripe, melting, juicy, rich, vinous.—Middle August. Tree hardy, moderate bearer.

Early Tillotson.—American. Leaves serrated without glands, fl. s. Fruit medium to large; pale yellowish white, considerable red in the sun; flesh melting, whitish, red at stone, very juicy, rich, and excellent.—Middle August. F. Tree a slow grower, mildews badly at the North, but South it is one of the best and most profitable sorts.

Early York (SERRATE EARLY YORK).—Leaves serrated without glands, flowers large; fruit medium size, roundish, slightly ovate; pale red on greenish white ground, dark red in the sun; flesh greenish white, very tender, melting, juicy, sprightly, rich, excellent.—Middle of August. Tree a good, fair grower, prolific; one of the earliest and best for orchard or garden.

Freeman.—Comparatively a new variety, originated at South Pass, Ill., where it is esteemed, on account of late maturity, as a market sort; gl. glob. Fruit large, roundish; yellow, with rich red cheek in the sun; flesh yellow, red next the stone, juicy, sweet, rich.—Middle October. F.

George the Fourth.—Believed to be American. Gl. glob., fl. s. Fruit large, round, deep suture, one side enlarged; pale yellowish white, rich, dark red cheek in sun; flesh tinted with red at the stone, melting, juicy, very rich and delicious.—Last of August. F. Tree vigorous, hardy, and productive; one of the best in quality, and successful in almost every locality.

Grosse Mignonne.—Gl. glob., fl. large. Fruit large, roundish, depressed, hollow suture at apex; greenish

yellow, mottled with red, purplish red cheek; flesh white, marked with red at stone, melting, juicy, very rich, high, vinous flavor.—Middle August. F. Tree a free grower, good bearer; in quality this peach has no superior, and is everywhere esteemed.

Haines' Early.—American. Gl. glob., fl. s. Medium size, round, flattened at apex, one side enlarged; pale white, nearly covered with red; flesh greenish white, very juicy, melting, sweet, fine flavor.—Early August. F. Tree a fine grower, hardy and productive, valued highly for the orchard.

Hale's Early.—American. Gl. glob., fl. large. Fruit medium, nearly round; greenish, mostly covered with red; flesh white, melting, juicy, rich, sweet.—Last of July. F. Tree very hardy, a vigorous grower and abundant bearer; it is the earliest ripening good peach, but is liable to rot in some localities; where it does not, it is one of the most profitable.

Heath Cling.—American. Gl. ren., fl. s. Fruit very large, oblong, roundish, suture distinct, swollen point at apex; skin whitish, with blush or red tinge in the sun; flesh greenish white, very tender, melting, juicy, rich, and of the highest flavor, adheres closely to the stone.—October. Tree very hardy, vigorous, and productive. This is one of the best and most popular varieties in all the South and South-west. It does not always ripen well at the North, but may be gathered and kept for weeks. It is well suited to espalier training.

Hyslop's Cling.—American. Gl. ren., fl. s. Fruit large, roundish, inclining to oval; pale white, with a rich, red cheek; flesh very juicy, melting, vinous, rich, adheres closely to the stone.—Early in October. Tree a good grower, hardy and productive; an excellent fruit, and highly valued wherever grown.

Jacques' Rareripec.—American. Gl. ren., fl. s. Fruit

large, roundish, compressed; dark, rich yellow, mostly covered with dull red; flesh yellow, red at the stone, juicy, slightly sub-acid.—Middle September. F. A popular and profitable peach in all the New England and Northern States.

Kenrick's Heath (HEATH FREE).—American. Gl. ren., fl. s. Fruit very large, oblong, with a swollen point at apex; pale greenish white, with a purplish red cheek; flesh a little coarse; greenish white, deep red at the stone; juicy, melting, pleasant sub-acid.—Middle September. F. A hardy, vigorous, and productive variety, profitable, but not of the highest quality.

La Grange.—American. Gl. ren., fl. s. Fruit large, roundish, oblong; greenish white, some red in sun; flesh juicy, melting, very rich, sweet and high-flavored.—Last of September. F. Tree a hardy, good grower and bearer, highly esteemed and profitable in New Jersey, Delaware, and the peach regions of the South-west.

Large Early York (HONEST JOHN).—American. Gl. glob., fl. s. Fruit above medium, roundish; whitish, with a clear, rich red cheek; flesh almost white, fine-grained, juicy, rich, mild, excellent.—Last of August. F. Tree vigorous, hardy, productive, and profitable either for orchard or garden.

Late Admirable (TETON DE VENUS).—Gl. glob., fl. s. Very large, roundish, oval; deep, bold suture, small, acute, swollen point at apex; pale, yellowish green, with a red cheek, very dark in sun; flesh greenish white, red at stone, juicy, melting, delicious.—Middle of September. F. Tree vigorous and productive, hardy; valuable and profitable either for garden or orchard.

Lemon Cling.—American. Gl. ren., fl. s. Large, oblong, with a large projecting point at apex, like a lemon; fine yellow, with a rich brown red cheek; flesh firm, yellow, red at the stone, to which it firmly adheres; rich,

sprightly, vinous, sub-acid.—Last of September. A native of South Carolina; the Lemon Clingstone is successful and popular North and South. Many seedlings have been grown from it, but none to supersede it.

Monstrueuse de Douc.—Gl. ren., fl. s. Fruit large, roundish, suture distinct; whitish, nearly covered with red; flesh red at the stone, juicy, melting, vinous.—Last of September. F. Tree very vigorous and productive; an excellent variety from France, not as well known or extensively cultivated as it deserves.

Morris's White (MORRIS'S WHITE RARERIPÉ).—American. Gl. ren., fl. s. Fruit rather large; greenish white, with a creamy tint when fully ripe, and a slight tint of purplish red on the sun-exposed side; flesh white to the stone, juicy, melting, sweet, and rich.—Middle of September. F. Tree a vigorous grower, healthy, moderate but good bearer. A fruit highly valued for canning.

Noblesse.—Leaves serrated without glands, flowers large. Fruit large, roundish, oblong; pale green, with clouded red in the sun; flesh greenish white, juicy, melting, excellent.—Last of August. F. Tree healthy and productive. A capital old English sort, highly esteemed wherever grown.

Oldmixon Cling.—Gl. glob., fl. s. Fruit large, roundish, oval, one side slightly enlarged; yellowish white, with a red cheek; flesh pale white, exceedingly rich, melting, and juicy.—Middle of September. Tree healthy, hardy, vigorous, and productive; one of the best and most profitable of the clingstones.

Oldmixon Freestone.—Gl. glob., fl. s. Fruit large, roundish, slightly oval, one side swollen; pale yellowish white, marbled with red, deep red in the sun; flesh white, red at stone, tender, juicy, rich, sugary, vinous.—Early to middle of September. F. Tree hardy, very productive; one of the most valuable of all the white-fleshed peaches, either for orchard or garden.

Red Cheek Melocoton.—American. Gl. glob., fl. s. Fruit large, roundish, oval, swollen point at apex; yellow, with a deep red cheek; flesh deep yellow, red at the stone, juicy, melting, rich, vinous.—Middle September. F. Tree very hardy and productive; this is one of the most reliable of all varieties, profitable for orchard or garden. From it a large number of varieties have been grown, few, however, sufficiently distinct or superior.

Salway.—Fruit large, roundish, one side enlarged, suture distinct; deep, with a marbled, rich, brownish red cheek; flesh yellow, firm, juicy, rich, vinous, sugary.—Middle October. F. This is a new English variety, giving promise of great value as a late-ripening, showy, market sort.

Scott's Nonpareil.—Large, roundish; yellow; a seedling from Red Cheek Melocoton, ripening a few days later, and highly esteemed in New Jersey, where it originated as a valuable market variety.

Smock Freestone.—American. Gl. ren. Fruit large, oval, compressed on its sides; orange yellow, mottled with red, deep red cheek in sun; flesh yellow, red at stone, moderately juicy and rich, vinous.—Early October. F. Tree a vigorous grower and productive; highly valued as a late ripening, showy, and profitable market sort.

Snow.—American. Gl. ren., fl. s. Fruit medium, roundish; clear white; flesh white to the stone, juicy, melting, sprightly, sweet, and rich.—Early September. F. Tree hardy, very productive; highly valued for preserving, canning, etc.

Stump the World.—American. Gl. glob., fl. s. Fruit very large, roundish, oblong; creamy white, with a bright, red cheek; flesh white, juicy, high-flavored.—Last of September. F. Tree vigorous and productive, esteemed in New Jersey, where it originated, as a profitable market variety.

Sturtevant.—American. Fruit medium size, roundish ; rich yellow, mostly covered with dark, rich red ; flesh yellow, red at the stone, juicy, melting, sugary, rich, excellent.—Early September. F. Tree a good, healthy grower, and an abundant bearer ; esteemed in Ohio, where it originated as the best in quality of all the yellow-fleshed varieties.

Surpasse Melocoton.—This is a seedling originated in the grounds of Ellwanger & Barry, of large size, roundish, oval ; rich yellow, with a red cheek ; flesh pale yellow, nearly white, juicy, rich, sugary, vinous, excellent.—Early September. F. Tree a strong grower, productive, and promising to be a valuable market sort.

Susquehanna.—American. Large, nearly round, suture distinct ; yellow, with a beautiful, broad, red cheek ; flesh yellow, sweet, rich, juicy, vinous.—Middle to last of September. F. Tree a fine grower, very popular in Pennsylvania.

Tippecanoe Cling.—American. Gl. ren., fl. s. Fruit very large, nearly round, flattened slightly at sides ; yellow, with a fine, rich, red cheek ; flesh yellow, juicy, sweet, vinous.—Last September and early October. Tree vigorous, productive ; a handsome peach of very good quality, valued highly where known as a market sort.

Troth's Early.—American. Gl. glob., fl. s. Fruit medium size, roundish, oval ; whitish, bright red in sun ; flesh white, red at the stone, juicy, sweet.—Early in August. F. Tree vigorous, very productive ; this variety is extensively grown, and esteemed highly valuable as a market orchard sort ; it is also fine for the orchard, house, and the garden.

Ward's Late Free.—American. Gl. ren., fl. s. Fruit rather large, roundish, slightly oval ; white, with a beautiful red cheek ; flesh white, tinged with red at stone, juicy, melting, sweet, delicious.—Late September. F.

Tree vigorous and productive; very valuable for orchard or garden.

Walburton Admirable.—English. Fl. s. Fruit large, roundish; greenish white, shaded with dark red in the sun; flesh white, stained red at the stone, melting, juicy, rich, and sweet.—Last of September. F. Tree a good grower and productive; this variety, wherever it has been grown in this country, has been found valuable.

Yellow Alberge (BARNARD'S YELLOW).—Gl. glob., fl. s. Fruit medium or above in size, roundish; yellow, with a deep, purplish red cheek; flesh yellow, deep red at stone, juicy, sweet, vinous, pleasant.—Early September. F. Tree hardy, vigorous, and productive. This old French peach holds a popular position as a reliable and profitable variety, although only of second-rate quality; from it many seedlings have been grown, almost identical with its parent.

Yellow Rareripe.—American. Gl. glob., fl. s. Large, roundish; orange yellow, a rich, red cheek, shaded off and striped; flesh, deep yellow, red at the stone, melting, juicy, vinous, excellent.—Last of August. F. Tree vigorous and productive; one of the best and most profitable very early yellow-fleshed peaches grown.

SELECT GARDEN VARIETIES.

Hale's Early, Early York, Cooledge's Favorite, Oldmixon Freestone, Large Early York, George the Fourth, Ward's Late Freestone.

Varieties generally successful in New England, Western New York, Ohio, and Michigan.—Cole's Early Red, Columbia, Cooledge's Favorite, Crawford's Early, Crawford's Late, George the Fourth, Jacques' Rareripe, Large Early York, Late Admirable, Morris's White, Oldmixon Free, Red Cheek Melocoton, Smock, Ward's Late Free, and Yellow Rareripe.

Varieties for Profitable Market Orchards.—Hale's Early, Troth's Early, Yellow Rareripe, Crawford's Early, Crawford's Late, Haines' Early, Oldmixon Freestone, Red-cheek Melocoton, Smock, Yellow Alberge.

Varieties successful South and South-west.—Hale's Early, Early Tillotson, Troth's Early, Columbia, Crawford's Early, Druid Hill, Crawford's Late, George the Fourth, Haines' Early, Heath Cling, Red-cheek Melocoton, Smock, Stump the World, Tippecanoe, Freeman.

SECTION 7.—SELECT PLUMS.

Autumn Gage.—Origin New York. Medium size, oval, broadest at the stem end; pale yellow, with a thin, whitish bloom; flesh greenish yellow, juicy, sweet, pleasant, separates freely from the stone.—September. Tree a vigorous, spreading grower, and an abundant bearer.

Bleecker's Gage.—Origin New York. Medium or above in size, roundish, oval; yellowish, with a thin, white bloom; flesh yellow, juicy, rich, sweet, excellent, separates freely from the stone.—Last of August. Tree a good grower and productive.

Bradshaw.—Large, oval, obovate; reddish purple, with a light blue bloom; flesh rather coarse, juicy, brisk, pleasant, adheres slightly to the stone.—August. Tree an upright, vigorous grower, productive and profitable.

Coe's Golden Drop.—Origin England. Large, oval, distinct suture; light yellow, with dark, carmine red spots in the sun; flesh yellowish, firm, juicy, rich, adheres to the stone.—Last of September. Tree a moderately vigorous grower, hardy, and a great bearer; a variety widely disseminated and highly esteemed.

Columbia.—Origin New York. Large or very large, nearly round; brownish, reddish purple, covered with a blue bloom; flesh orange, sweet, and rich, separates from

the stone.—Last of August. Tree a very vigorous grower, and productive. A valuable market sort.

Denniston's Superb.—Origin New York. Medium or below, roundish, flattened; pale, but rich, yellow blotches of purple in the sun; thin, white bloom; flesh, juicy, rich, sweet, vinous, separates from the stone.—Last of August. Tree moderately vigorous, forming a small, round head, very productive; one of the best for the garden.

Duane's Purple.—Origin New York. Large, oval, distinct suture, one side enlarged; pale red, becoming reddish purple in the sun, lilac bloom; flesh amber color, juicy, sprightly, moderately sweet, adheres partially to the stone.—Middle to last of August. Tree very vigorous and productive.

Early Favorite.—Origin England. Small to medium, roundish, oval; very dark, almost black, blue bloom; flesh greenish yellow, juicy, sweet, vinous, separates from the stone.—Early in August. A new sort, highly praised abroad, but as yet little grown in this country.

Fellenberg.—An old, Italian prune, a moderate, spreading grower, great bearer, and very valuable; fruit medium, oval; dark blue, with a bloom; flesh dark yellow, juicy, sweet, and good, separates from the stone.—Early in October.

General Hand.—Origin Pennsylvania. Very large, roundish, oval; deep yellow, marbled with greenish yellow; flesh coarse, pale yellow, sweet, moderately juicy, separates freely from the stone.—September. Tree very vigorous and productive; fine for market.

German Prune.—Medium, long, oval, one side swollen; purple, with a thick blue bloom; flesh firm, not juicy, greenish, sweet, pleasant, separates freely from the stone.—September. Tree a good grower, very productive, valuable for market and highly esteemed for drying.

Green Gage.—Origin France. Rather small, round; yellowish green, with dottings of red in sun; flesh pale green, exceedingly juicy and melting, rich, sprightly, luscious, separates from the stone.—Middle of August. Tree a short-jointed, healthy but slow grower, making a small, round head, and bearing abundantly; has no superior in quality; suitable for a choice garden collection.

Huling's Superb.—Origin Pennsylvania. Very large, roundish, oval, shallow suture; greenish yellow, covered with a thin pale bloom; flesh greenish yellow, rather coarse, rich, brisk, sprightly, adheres to the stone.—Middle of August. Tree a very vigorous, upright grower, with large foliage, a good, moderate bearer.

Ickworth Impératrice.—Origin England. Rather above medium size, obovate; purple, traced with fawn; flesh greenish yellow, sweet, juicy, rich, adheres partially to the stone.—Early October. Tree a good, fair grower, productive; valuable for its late ripening, and for its peculiarity of hanging a long time on the tree as well as keeping after being gathered; not much grown, but promising to be of great market value.

Imperial Gage.—Origin New York. Rather above medium size, oval, suture distinct; green, until fully ripe, when it is known by the peculiar marbling of two shades of green; white bloom; flesh greenish, very juicy, rich, melting, pleasant flavor, separates freely from the stone.—Early September. Tree one of the best of growers, and productive; everywhere popular and profitable for market or garden.

Jefferson.—Origin New York. Large, roundish, oval; golden yellow, with a beautiful red cheek; flesh orange yellow, juicy, rich, luscious, separates freely from the stone.—Last of August. Tree a moderate, rather slow grower, but a regular, good bearer; one of the best in quality.

July Green Gage.—Medium, roundish, oblong, suture distinct; greenish yellow, tinted with purple in the sun; flesh yellow, juicy, sweet, separates from the stone.—Last of August. Tree a moderate grower, productive.

Lawrence's Favorite.—Origin New York. Large, roundish, a little flattened; dull, yellowish green, clouded with streaks of a dark shade; flesh greenish, juicy, melting, rich, sprightly, delicate, vinous, separates freely from the stone.—Middle of August. Tree vigorous, upright, very productive.

Lombard.—Origin New York. Medium, roundish, oval; violet red, thin bloom; flesh deep yellow, juicy, pleasant, not rich, adhering to the stone.—Last of August. Tree vigorous, a great bearer, popular and profitable as a market sort, succeeds where many other sorts fail.

Lucombe's Nonsuch.—Origin England. Above medium, roundish; yellowish green, distinctly streaked with yellow and orange; flesh pretty firm, greenish, adheres to the stone.—Early September. Tree moderately vigorous, very productive.

Magnum Bonum, Yellow (YELLOW EGG, etc.).—A popular old variety, with some twenty synonyms. Large, or very large, egg shape, or oval; yellow, with white dots and a thin bloom; flesh yellow, acid until fully ripe, when it is sweet, adheres to the stone.—Last of August. Tree very vigorous, productive; valued for market and cooking.

McLaughlin.—Origin Maine. Large, roundish, flattened at ends; yellow, dotted and marbled with red in the sun, thin bloom; flesh yellow, rather firm, juicy, very sweet, delicious, adheres to the stone.—Last of August. Tree a hardy, vigorous grower, productive; one of the most valuable.

Monroe Gage.—Origin New York. Rather above medium, oval; greenish yellow, rarely a blush; flesh

greenish yellow, not very tender, but sweet.—Early September. Tree vigorous, productive.

Ontario.—Originated by Ellwanger & Barry, New York. Large, roundish; yellow, marbled; flesh moderately juicy, sweet, rich, adheres to the stone.—Early in August. Tree a good grower and very productive.

Orleans.—See Smith's Orleans.

Peters' Yellow Gage.—Medium, roundish, oval; yellow, with crimson dots in the sun, thin, light bloom; flesh yellowish, juicy, adheres slightly to the stone.—Middle of August. Tree a moderately vigorous grower; an abundant bearer.

Pond's Seedling.—Origin England. Very large, oval; yellowish, covered with violet red, thin, white bloom; flesh yellow, a little coarse, juicy, sugary.—Middle of September. Tree a good grower, and an abundant bearer; a beautiful fruit.

Prince Englebert.—Origin Belgium. Large, oblong, oval; deep purple, with a blue bloom; flesh yellowish green, juicy, sugary, rich, separates freely from the stone.—Last of August. Tree vigorous, a great bearer; very valuable for market, dessert, or cooking.

Prune d'Agen (ROBE DE SERGENT, etc.).—Medium size, oval; violet purple, with a thick bloom; flesh greenish yellow, juicy, rich, sugary, and delicious, adheres slightly to the stone.—Last of September. Tree a moderate grower, very prolific.

Quackenboss.—Origin New York. Large, roundish, oblong; deep purple, covered with blue bloom; flesh greenish yellow, a little coarse, juicy, sprightly, sweet, adheres slightly to the stone.—September. Tree a very rapid, upright grower, and productive.

Reine Claude de Bavay (BAVAY'S GREEN GAGE).—Origin Belgium. Large, roundish, a little flattened; greenish yellow, with splashes of green, thin bloom; flesh

yellow, juicy, sugary, melting, rich, excellent, separates from the stone.—Last of September. Tree a vigorous grower and very productive; one of the best in quality, very valuable and extensively planted as a late market sort.

Saint Catherine.—Origin France. Medium size, obovate, deep suture; pale yellow, a little reddish in the sun, thin, white bloom; flesh yellow, juicy, rather firm, and adhering partly to the stone.—Middle to last of September. Tree an upright, rather slender grower; productive and highly prized for drying.

Saint Lawrence.—Originated in the grounds of Ellwanger & Barry, New York, from a seed of Smith's Orleans. Large; dark purple; flesh juicy, melting, sweet, adheres to the stone.—September. Tree a good grower, productive.

Shropshire Damson.—Origin England. Medium to small size, oval; dark purple; flesh melting, juicy, separates freely from the stone.—October. Tree healthy and productive; one of the best of the Damsons.

Smith's Orleans.—Origin Long Island. Large, roundish, oval; reddish purple, covered with a blue bloom; flesh deep yellow, a little firm, very juicy, brisk, vinous, adheres to the stone.—Last of August. Tree vigorous and very productive; one of the most valuable for orchard or garden.

Victoria (SHARP'S EMPEROR, etc.).—Origin England. Large, roundish, oval; light yellow, marbled, spotted, and shaded with lilac and purple, thin, lilac bloom; flesh yellow, coarse, not juicy or sugary, a little vinous, and separates from the stone.—Middle September. Tree vigorous, but irregular in growth, productive; a plum of the largest size, showy, and valuable for market.

Wangenheim.—Origin Germany. Medium, oval; deep purple, thick, blue bloom; flesh greenish yellow, rather

firm, juicy, sugary, rich, separates from the stone.—Last of August. Tree a moderate grower, but good bearer; one of the best designated as *Prunes*.

Washington.—Origin New York. Large to very large, roundish, oval; dull or deep yellow, with marblings of green, with a pale red or crimson blush in the sun; flesh yellow, firm, very sweet and rich, separates freely from the stone.—Last of August. Tree a stocky, vigorous, healthy grower, very productive; one of the most reliable for market or garden.

Yellow Gage (PRINCES).—Origin Long Island. Medium to large, oval, broadest next the stalk; golden yellow, covered with a white bloom; flesh deep yellow, rich, sugary, juicy, melting, separates freely from the stone.—Early in August. Tree very vigorous, forming a large, spreading head, very hardy and productive; a popular and profitable variety.

SMALL SELECT LISTS OF PLUMS.

For the Garden.—Coe's Golden Drop, Green Gage, Imperial Gage, Jefferson, Lawrence's Favorite, Smith's Orleans, Reine Claude de Bavay, McLaughlin, Washington.

For Market.—Imperial Gage, Yellow Magnum Bonum, Smith's Orleans, Pond's Seedling, Lombard, Reine Claude de Bavay, Bradshaw, Columbia, General Hand, Quackenboss.

For Drying.—German Prune, Saint Catherine, Fellemberg.

THIRD DIVISION.—BERRIES.

CURRANTS, GOOSEBERRIES, RASPBERRIES, STRAWBERRIES, BERBERRIES, BLACKBERRIES, MULBERRIES, GRAPES, AND FIGS.

SECTION 8.—SELECT CURRANTS.

The Currant is a most useful fruit, indeed indispensable to every garden, large or small; it fills a space of a couple of weeks after the strawberries, raspberries, and cherries, and before the apricots, early apples, and pears; and besides this, it possesses such a remarkable combination of sweet and acid, as fits it for an almost endless variety of useful and agreeable preparations, both in the green and ripe state.

The white varieties are mildest flavored, and therefore better for using in a raw state when ripe. The red are preferable for jellies, etc., on account of their beautiful color.

Black Naples.—The largest and best black currant; bears profusely; valuable for jam and jellies.

Cherry.—Very large, exceeding an inch in circumference, bunches short, color dark red, ripens same time as Red Dutch, shoots stout, short-jointed, and erect, foliage thick, dark green, slightly folded, and bluntly and coarsely serrated. Mr. Lewelling, of California, has 40 acres planted with this variety; we saw the plantation in full fruit in 1870. It is stated that the crop of 1871 was 150,000 lbs., sold at from 8 cents to 15 cents per pound.

La Versaillaise.—Similar to the foregoing in all respects, so much so as to be supposed by many to be identical; it is generally believed that it is less acid and the bunches a little longer; a very vigorous grower, productive, and highly valued.

Long-Bunched Red.—Much like Red Dutch, but with clusters longer and larger, and rather larger fruit; a strong-growing, productive, and valuable variety.

Prince Albert.—A moderate grower, with large, stiff, deeply-cut foliage, very productive; valued for its late ripening; fruit light red, large, acid.

Red Dutch.—A well-known variety, generally superseded by the larger varieties.

Short-Bunched Red.—A strong, upright grower; berries large; bunches short; mild acid.

Victoria or Houghton Castle.—Very large, bright red, bunches five or six inches long; hangs on the bushes after others are gone; distinguished at once by its remarkably long bunches and bright red color, and by the foliage, which is quite distinct, dark green, coarsely and bluntly serrated, quite flat, and frequently reflexed or turned backwards at the edges; the shoots are not so stout and erect as those of the Cherry.

White Dutch.—Yellowish white, transparent, milder than the red, and better for using raw; excellent.

White Grape.—Larger every way than the preceding; the largest white currant; growth rather spreading, foliage thicker, deeper green, and more reflexed. There are several other sorts under cultivation, of little value, unless to those who are making large collections for curiosity and experiment.

SECTION 9.—GOOSEBERRIES.

CLASS I.—ENGLISH VARIETIES.

The following, from the large English sorts, have all proved excellent. In our climate these are all more or less subject to mildew.

Red.—Albion, Crownbob, Echo, Houghton's Boggart, Ironmonger, Lancashire Red, Prince Regent, Roaring

Lion, Shakespeare, Sportsman, Top Sawyer, Wineberry, Young's Wonderful.

White.—Chorister, Fleur de Lis, Leigh's Toper, Queen Caroline, Smiling Beauty, Whitesmith, Wellington's Glory, White Muslin, etc.

Green.—Berrier's Greenwood, Chipendale's Conquering Hero, Green Mountain, Green Vale, Green Willow, Green Ocean, Independent, Jolly Cutler, Massey's Heart of Oak, Profit.

Yellow.—Bunker Hill, Capper's Early Sulphur, Golden Drop, Husbandman, etc.

CLASS II.—AMERICAN VARIETIES.

American Seedling (PALE RED).—A vigorous grower; bush upright, with slender wood; very productive, never mildews; fruit medium to small, pale red, sweet, very good; hangs a long time, very valuable.

Downing.—Originated at Newburgh, N. Y. An upright, strong grower, productive; fruit medium or above, roundish oval; green, with the rib veins distinct, smooth, juicy; very good. The best for family use of any of the American sorts.

Houghton's Seedling.—Raised in Massachusetts from the seed of a native variety. It is a vigorous grower, with drooping branches, very productive; fruit medium size or below, smooth, pale red, sweet, very good.

Mountain Seedling.—Originated with the Shakers at Lebanon, N. Y. A very strong, straggling grower, forming a large bush, productive; fruit large for its class, skin thick, flesh sweet; valued for market.

Smith's Improved.—Similar to American, but larger in size of its fruit.

SECTION 10.—SELECT RASPBERRIES.

CLASS I.—FOREIGN VARIETIES AND THEIR SEEDLINGS OF AMERICAN ORIGIN.

Belle de Paluan.—A French variety, with strong, vigorous, upright canes; fruit large, conical; bright crimson, firm, juicy, and rich; short, purplish spines.

Clarke.—Originated at New Haven, Ct. Canes strong and vigorous, long spines, half-hardy; fruit large, conical, bright crimson, rather soft, juicy, excellent; produces suckers freely; succeeds finely in light soils.

Fastolf.—Canes very strong, nearly hardy, erect, branching; fruit very large, roundish, conical; purplish red, rich, fine flavor; productive.

Franconia.—Canes strong, branching; yellowish brown, short, stout, purple spines, large, obtuse, conical; purplish red, pretty firm, rich acid; one of the hardiest of this class, productive and profitable.

French (VICE-PRESIDENT FRENCH).—Originated in Philadelphia, Pa. Canes strong, upright, spines short and stout; fruit medium to large, roundish, rich, bright crimson, large grains, sweet and very good.

Hornet.—A French variety, with strong, upright, vigorous canes, stout, purplish spines; fruit large, conical, rather firm, crimson red, juicy, sweet.

Hudson River Antwerp (RED ANTWERP OF THE HUDSON RIVER).—Origin unknown. Has been long and profitably cultivated along the Hudson River, where it is esteemed most valuable of all sorts for market. The crop from three acres has in one season sold for \$1,500. Canes short, stout, almost spineless.

Knevett's Giant.—A very strong grower, erect, small, reddish spines; fruit large, obtuse, conical, deep red, firm, rich; almost hardy and very productive.

Orange (BRINCKLE'S ORANGE).—Origin Philadelphia, Pa. Canes strong, branched, white spines; fruit large, conical, clear, orange yellow, juicy, rather soft, sweet, rich, and excellent; the best of all the light-colored varieties.

Red Antwerp.—This is the common Red Antwerp of England; distinct from the Hudson River Antwerp. Canes tall and strong, light, red spines; fruit large, obtuse conical, dark red, juicy, brisk, vinous, fine flavor.

Semper Fidelis.—An English variety, with strong, upright canes, purplish, stiff spines; fruit large, conical, firm, juicy, sub-acid.

Victoria.—An English variety of rather dwarf habit; fruit very large, dark red.

CLASS II.—AMERICAN SPECIES AND VARIETIES, BLACK CAPS, ETC.

American Black Cap (DOOLITTLE, JOSLYN'S BLACK CAP, etc.).—A hardy, native variety, improved by cultivation, very productive; one of the best of its class for profitable market growing, as it ripens early and carries well.

Davison's Thornless.—A variety of the foregoing, but free from spines and ripening some days earlier; the fruit is not quite as large as the American Black Cap, but is sweeter; moderately productive.

Miami (MAMMOTH CLUSTER, MCCORMICK).—Another variety of the Black Cap, stronger in its growth, fewer spines, and very productive; the fruit is also larger, deeper color, more bloom, and ripens later.

Ontario.—A new variety of the Black Cap found near Fairport, N. Y., and introduced by E. E. Lord, of Newark, N. Y. Larger and a few days earlier than the common sort, and quite as good in quality, but has a thick coating of white bloom, which injures it for market.

Philadelphia.—A variety found wild in the county of Philadelphia, Pa. Canes very vigorous, tall, branching, almost free from spines, and very productive; fruit medium, roundish, dark crimson, moderately juicy, mild sub-acid, rather soft; a hardy and valuable variety, succeeding finely on light soils, and in latitudes where the Antwerps can not well be grown.

Seneca Black Cap.—A variety of the Black Cap, larger and later than the American, very vigorous and very productive; fruit has a shade of purple, with a light bloom, juicy and sweet.

CLASS III.—AUTUMNAL BEARING VARIETIES.

The product of this class of Raspberries is upon the ends of the canes of the present season's growth, and to insure a full autumn crop, all the old canes should be cut away in the spring, and all the suckers kept down, confining the new growths to the few strong, vigorous canes.

Belle de Fontenay.—A French variety, with stout, branching canes, and an over-abundance of suckers, which must be cut away as so many weeds, in order to insure a crop; fruit large, roundish, conical, purplish red, sprightly, moderately firm, and rich.

Catawissa.—A native of Pennsylvania. Canes strong and productive; fruit medium, rather flat, crimson or purplish red, thick bloom, sprightly sub-acid; a fine sort for the garden.

Merveille des Quatre Saisons (OCTOBER RED).—A French variety, with strong, upright canes and purple spines; fruit medium, roundish, somewhat conical, bright red, rather soft, juicy, sweet, and rich.

Ohio Everbearing.—A variety of the American Black

Cap, in every respect identical, except that it has the habit of fruiting in autumn.

Surpasse Fastolff.—A new, large-fruited variety; bright red; promising.

White Perpetual.—Strong, vigorous canes; fruit large, pale, yellowish white; productive.

SECTION 11.—SELECT STRAWBERRIES.

CLASS I.—AMERICAN VARIETIES.

Agriculturist.—Originated in Newark, N. J. Plant vigorous, a little variable, sometimes very fine, broad foliage, productive; fruit large, roundish, conical, irregular, dark red, pretty firm, juicy, sweet, and rich.

Charles Downing (DOWNER).—Originated in Kentucky. Plant very vigorous, with long leaf and foot-stalks, productive; fruit large, conical, pretty regular, scarlet, firm, pinkish flesh, juicy, sweet and rich.

Durand's Seedling.—Originated in New Jersey. Plant moderately vigorous, productive; fruit large, irregular, scarlet, somewhat firm, juicy; ripens early and keeps long in bearing.

Downer's Prolific (DOWNER).—Originated in Kentucky. Plant vigorous, hardy, very prolific; fruit large, roundish, conical, clear, bright scarlet, rather soft, juicy, rather acid; ripens early.

Green Prolific.—Origin New Jersey. Plant very vigorous, hardy, and very productive; valued for home or near market; does not bear long transportation; fruit large, obtuse, conical, scarlet, surface soft, rather acid, but rich.

Hovey.—Originated at Boston, Mass. An old, well-known sort, succeeds in rich, good soils, is one of the

handsomest and firmest grown ; plant vigorous, moderately productive ; fruit large, or very large, roundish, rich, shining scarlet ; flesh firm, rich, juicy, sweet, agreeable ; medium season of ripening.

Ida.—Origin New York. Plant vigorous, very productive ; fruit medium, roundish, conical, dark, rich red ; flesh rather firm, sprightly, juicy, slightly acid ; among the earliest, and continues late.

Jenny Lind.—Origin Massachusetts. Plant hardy, vigorous, and productive, ripens early ; fruit medium, conical, dark glossy crimson, rather firm, juicy, sprightly, sub-acid.

Kentucky (DOWNER).—Originated in Kentucky. Plant very vigorous, with leaf and fruit stalks hardy and productive ; fruit large, roundish, conical, dark red, moderately firm, juicy, a little acid, rich, and good ; ripens late ; a new sort, as yet but little grown ; promising.

Large Early Scarlet.—An old variety, an abundant bearer, very early, and hardy ; fruit small to medium, roundish, ovate, scarlet ; flesh tender, rich, excellent ; should be in every garden.

Lennig's White.—Origin Pennsylvania. Plants vigorous ; fruit large, roundish, flattened, whitish, tinged with red ; flesh soft, tender, juicy, a delicious pineapple flavor, excellent ; a moderate bearer, but of such superior quality as to be indispensable for the amateur's garden.

Longworth's Prolific.—Origin Ohio. Plant vigorous, hardy, very productive ; fruit large, roundish, light crimson ; highly valued for canning ; extensively grown in California, where it is regarded as one of the most profitable.

Nicanor.—This variety originated in the grounds of Ellwanger & Barry, New York, as seedling of *Triomphe de Gand*, and so far as tested—now some eight years—

proves to be a valuable and profitable variety, either for market or garden. It is hardy, vigorous, productive, early, following close to Early Scarlet, and continues a long time; fruit uniform, moderately large, roundish, conical, bright scarlet; flesh reddish, rather firm, juicy, rich, sweet, fine flavor.

Philadelphia.—Vigorous, productive, ripens early. Large, roundish, conical, bright, juicy, sprightly, good.

President Wilder.—Originated by Hon. Marshall P. Wilder, of Massachusetts. Plants vigorous, hardy, productive; fruit large and handsome, obtuse, conical, bright crimson scarlet; flesh juicy, firm, rich, sweet, excellent. This is a new variety of high promise, and in general, so far as tested, sustains all the awards of praise that have been bestowed upon it.

Russell's Seedling (RUSSELL'S PROLIFIC).—Origin New York. Plant vigorous and productive; fruit large, conical, scarlet crimson; flesh rather soft, mild, pleasant.

Wilson's Albany.—Origin New York. The most widely grown and universally successful and profitable of any strawberry yet produced. Plant very hardy, vigorous, and very productive, early to ripen and continuing to the latest; large, conical, deep crimson; flesh crimson, tender, brisk, juicy, sub-acid; will only rank as second or third in quality.

CLASS II.—FOREIGN VARIETIES.

Jucunda.—Plants vigorous, hardy, productive; fruit large to very large and beautiful, conical, sometimes flattened coxcomb shape, clear, light scarlet; flesh light pink, moderately firm, sweet, often hollow and deficient in flavor.

Napoleon III.—Plants vigorous in rare cases, moderately productive; generally bears only a few large and

beautiful fruit ; fruit large to very large, irregular, conical, sometimes coxcomb shape, light scarlet ; flesh white, rather firm, juicy, sweet, and rich.

Perpetual Pine (GLOEDE'S).—Plant vigorous, productive, commences to ripen early and continues a long time in bearing ; fruit large, roundish, flattened, obtuse, conical, scarlet ; flesh firm, juicy, rich, sweet.

Triomphe de Gand.—Plant vigorous, hardy, and productive ; fruit large, roundish, obtuse, sometimes coxcomb shape, bright red, greenish at apex end, glossy ; firm, a little hollow at core, juicy, rich, aromatic, agreeable. This and Jucunda are probably the most generally successful of the foreign sorts.

Trollope's Victoria (GOLDEN QUEEN, etc.).—Plant vigorous, moderately productive ; fruit large, roundish, pale red ; flesh light scarlet, tender, juicy, sweet, rich, aromatic.

CLASS III.—ALPINE VARIETIES.

Alpine Wood.—The wild strawberry of Europe ; red and white in color. Plants very hardy, productive, ripening a long time in succession ; fruit small, conical, with a peculiar musky, agreeable flavor ; easily grown from seed.

Alpine Bush.—The bush Alpines make no runners, and are highly valued on account of their long-continued, regular bearing from June to October, and for the facility with which they can be used as border plants, both useful and ornamental ; the fruit is small, red or white in color, conical, pleasant, musky, juicy, sweet ; propagated by division or seeds.

Autumnal Galland.—A productive variety, large, conical, light red, excellent.

Montreuil.—A large and excellent variety of the Alpine, much grown around Paris.

CLASS IV.—HAUTBOIS STRAWBERRIES.

Belle de Bordelais.—A new French sort, medium size, dark red, fine flavored; plant very beautiful, as all this class are, when in bloom; productive.

Monstrous Hautbois.—Plant very vigorous, with broad serrated foliage, highly ornamental, very productive, bearing its fruit, which is large, on high footstalks, dark colored, with a rich, slightly musky flavor.

Royal Hautbois.—Plant vigorous, very prolific, fruit medium to large, roundish, conical, dark crimson; flesh soft, sweet, musky, rich; originated by Thomas Rivers, of England, from seed of Belle de Bordelais.

SECTION 12.—BERBERRIES.

EPINE VINETTE OF THE FRENCH.

Common Red.—This is everywhere well known; grown not only for the fruit, which is used for preserves, jellies, and pickles, but for ornament. The bright scarlet oval fruit is borne in rich clusters, and hang on until late in the autumn.

Sweet-Fruited (*BERBERIS DULCIS*).—The fruit of this is much less acid than the common. The plant is not so vigorous.

Besides these, there are several species and varieties cultivated chiefly for ornament: *The White-fruited*, *The Violet-fruited*, *the Variegated-leaved*, foliage marked with yellow; *The Purple-leaved* and *Purple-fruited*, the most unique and ornamental of all, the former with beautiful violet-purple foliage.

They are all easily propagated by layers or suckers, and the rare sorts by grafting ; seeds of the purple produce a large proportion true.

SECTION 13.—BLACKBERRIES.

Dorchester or IMPROVED HIGH BUSH.—A moderately strong, upright grower, very hardy, a good, moderate bearer ; fruit medium to large, oblong, deep, shining black, when fully ripe, soft, juicy, rich, of the highest flavor, but not most productive. The only sort cultivated twenty years ago.

Kittatinny.—A strong grower, very productive, quite hardy ; fruit large to very large, roundish, conical, glossy black, rather firm, rich, juicy, sweet, excellent ; widely disseminated and everywhere a success ; profitable for market or garden.

New Rochelle or LAWTON.—A very strong grower, with strong, stout spines, hardy in most localities, very productive ; fruit very large, oval, black, rather soft, juicy, tender, sweet, excellent ; requires to be fully ripe, otherwise it is acid and lacking in flavor.

Wilson's Early.—A moderately strong grower, productive, and ripening early ; fruit large, oblong, oval, black, firm, juicy, a little hard at center, sweet and good ; a profitable, early market sort.

All the Blackberries ripen just after Raspberries, and help to fill up a vacant season just before the early peaches, pears, etc.

The fruit is not only agreeable for the dessert, but among the best for canning, and always healthful.

Several other varieties have been introduced, but none of them equal in value to those described above.

SECTION 14.—MULBERRIES.

Black.—This is a native of Persia. The berry is an inch and a half long, and nearly an inch in diameter, black, succulent, sugary, and rich. The tree is highly ornamental, very erect, with a large, spreading head. The leaves appear late in spring, are large, heart-shaped, sometimes lobed, deep green, and form a dense shade.

Everbearing.—This variety was grown from seed by Chas. Downing and is regarded as a valuable fruit; the fruit is large, one and a quarter inch long, and nearly half an inch in diameter, color from maroon to blue black; flesh juicy, sugary, sprightly, and vinous; it ripens gradually, a long time in succession.

Johnson.—This variety originated in Ohio. It is a strong, vigorous-growing tree, with very large leaves, and very productive; the fruit is large, blackish, sub-acid, mild, pleasantly agreeable.

SECTION 15.—GRAPES.

SELECT HARDY NATIVE GRAPES.

CLASS I.—BLACK GRAPES.

Adirondac.—This is a grape of excellent quality, the vine moderately vigorous, or rather delicate, a good bearer; fine bunch, large berry, ripens among the earliest; well suited to warm localities. Originated in Northern New York, near Lake Champlain.

Alvey.—A hardy, vigorous vine, moderately productive, bunches of medium size, berries small or medium; sprightly vinous, pretty free from pulp. Good in quality; not profitable. Ripens with Concord. Origin Pennsylvania.

Barry (ROGERS' No. 43).—A vigorous vine, produc-

tive, bunches large, compact, berries large, round; juicy, sweet, pleasant; flesh nearly free from pulp. Ripens about time of Concord.

Canada (ARNOLD'S No. 16).—The vine of this variety is much like Clinton, its bunches and berries larger, flesh nearly free from pulp, juicy and good. Ripens with Concord. Raised by Charles Arnold, of Ontario, and said to be a cross between Clinton and Black St. Peter's.

Clinton.—A well-known old sort. The bunches are small to medium, compact, berries small, black; colors early, but requires a considerable time after that to attain full maturity, and will hang until early winter. Successful both North and South. A hardy, productive, valuable sort.

Concord.—Almost too well known to need a word. It is a very strong, vigorous, and productive variety; succeeding in almost every soil and locality. One of the earliest and most profitable; valuable for garden or vineyard. The bunch is large, shouldered; berry large, round, black; flesh juicy, pleasantly sweet, agreeable; skin too thin to carry well, and therefore not good for distant markets.

Cornucopia (ARNOLD'S No. 2).—Medium-sized berry, with a large, compact, shouldered bunch; flesh nearly free from pulp; juicy, sweet, sprightly, and good. Ripens with Concord. Same origin as Canada.

Creveling.—An old variety. Supposed origin Pennsylvania. A fine grape, but does not always set well. The bunch is medium, often very loose, shouldered; berry medium, round, blue bloom; flesh tender, juicy, sweet, very little pulp; richer than Concord, and ripens a little before that variety.

Cynthiana.—A variety much like Norton's Virginia. Highly prized for wine purposes in the West; vine vigor-

ous, hardy, and productive, and by some deemed superior to Norton.

Elsinburgh.—An old variety; a moderate, regular bearer; much esteemed, where known, for the table. The bunch is pretty large, long, and loose, shouldered; berries small, round; flesh free from pulp, juicy, sweet, excellent.

Essex (ROGERS' No. 41).—Vine a vigorous and strong grower, productive; bunch medium size, short, shouldered; berry large, tender, and sweet. Ripens with Concord.

Eumelan.—A comparatively new variety, it has not yet been much tested. The vine is moderately vigorous; bunch of medium size; berry rather small; flesh tender, sweet, rich, juicy, excellent. It promises great value for the amateur garden or for a table variety, and may be valued for vineyard. A good bearer. Origin New York. Supposed to be a seedling of the Isabella.

Hartford Prolific.—A very popular variety because of its early maturity. The vine is vigorous, hardy, and a good bearer; bunch large, shouldered; berry large, round, musky; thick skin, black, with a bloom; flesh sweet, with a tough acid pulp; rich and good when fully ripe. Liable to drop its berries from the bunch when fully ripe, and more so on sand than clay soils. A week earlier than Concord.

Herbemont.—A Southern variety, highly esteemed in Missouri and many Southern localities, as profitable and desirable for wine or table. North it does not ripen its fruit generally. The bunch is large, compact; berries below medium, almost black; flesh juicy, sweet, rich, aromatic.

Herbert (ROGERS' No. 44).—A vigorous, strong grower. Moderately productive. Bunch rather loose, berry medium; flesh tender, sweet, a little pulpy, very good. Ripens with Concord. A large, handsome variety.

Isabella.—This old, well-known sort continues popular and profitable in many localities, but is rapidly being superseded. It is a vigorous grower, an immense bearer, and hardy, but in some localities it is liable to mildew. In quality, it is the best of any of the black grapes of its season. Bunches large, rather loose; berries oval, pretty large; flesh tender, juicy, sweet, slightly musky. Still one of the best for market, where it ripens, as it carries and keeps well.

Israella.—Originated with Dr. C. W. Grant, of Iona Island, N. Y. The vine is vigorous and a good bearer, ripening about with Concord. Bunch medium; berries above medium, black; flesh free from pulp, juicy and sweet.

Ives (IVES' SEEDLING).—This originated with Henry Ives, Cincinnati, O. The vine is very vigorous, hardy, and very productive. It is esteemed as a profitable wine grape, and is a tolerable table grape when fully ripe. Bunch medium size, compact, shouldered; berry medium, roundish oval; flesh with some considerable pulp, yet juicy and sweet. Ripens with Concord.

Merrimack (ROGERS' No. 19).—Vine vigorous and productive. Bunches medium, rather short; berry large, round, slight bloom; flesh tender, juicy, sweet. One of the earliest and best of the Rogers varieties.

Miles.—Of Pennsylvania origin. Vine a moderate grower, hardy, and very productive. One of the very earliest, good grapes to ripen. Bunch and berry small, round; flesh tender, slight pulp at center, juicy, vinous, very good.

Norton's Virginia.—Introduced to cultivation by Dr. D. N. Norton, of Richmond, Va. It is a strong, vigorous, long grower, producing very abundantly, and highly esteemed for wine. Bunch medium, shouldered; berries

small, purplish black ; flesh tender, juicy, rich, brisk, rough, sweet flavor. Although most largely grown in Missouri, it is equally adapted to the North, as it ripens with Isabella.

Othello (ARNOLD'S No. 1).—Originated with Charles Arnold, Canada West. A good, strong grower and productive, ripening early or with Delaware. Bunch large, shouldered, compact ; berry large ; flesh firm, juicy, a little pulp. Sprightly, very good.

Senasqua.—Originated with S. W. Underhill, Croton Point, N. Y. A vigorous grower, and productive. Bunch medium to large ; berry medium or above ; purplish black ; flesh juicy, tender, free from pulp, sweet, vinous, excellent. Ripens about with Concord, or perhaps a few days later. Said to be a cross between Concord and Black Prince. New and but partially tested.

Telegraph (CHRISTINE).—Originated in Philadelphia. Vine vigorous, hardy, very productive ; one of the earliest to ripen. Bunch above medium to large, compact ; berry large, round, black ; flesh juicy, tender, very little pulp, not as sweet as Hartford Prolific, but free of all the musky flavor, and ripening at same time.

To Kalon.—An old variety, originated at Lansingburgh, N. Y. A vigorous grower, hardy, but irregularly productive. Does not ripen evenly. Bunches large, shouldered, berries almost purplish black, covered with bloom ; flesh very sweet, buttery, very little pulp. A large, handsome grape, but quite variable in quality.

Union Village (ONTARIO).—Origin Ohio. A very vigorous grower, with immense foliage, productive. Bunch and berry very large ; flesh free from hard pulp, tender, juicy, vinous, pleasant. Vine rather tender at the North ; needs protection. A splendid fruit.

Wilder (ROGERS' No. 4).—This is believed to be the

best of the black varieties. Grown by E. S. Rogers, Salem, Mass. The vine is vigorous, hardy, a good bearer, and the fruit hangs well to the vine, and is a good keeper. Bunch large, compact, shouldered; berry large, round, black; flesh tender, slight pulp at center, juicy, sweet, rather rich and aromatic. Ripens about with Concord. Promises to be valuable for market on account of its size and beauty.

York Madeira (CANBY'S AUGUST).—An old variety. Originated in Pennsylvania; vine moderately vigorous, hardy, productive; bunch and berry medium; flesh sweet, sprightly vinous.

CLASS II.—RED GRAPES.

Agawam (ROGERS' No. 15).—Vine very vigorous, hardy, productive, a little liable to mildew; bunch variable, sometimes large and fine, often small and imperfect; berries large, roundish, thick skin; flesh tender, juicy, sweet, aromatic, hard center pulp, with a native musky aroma. Generally regarded as the best of Rogers' red varieties.

Catawba.—A native of Maryland. The Catawba does not always ripen at the North, except in certain localities; but where it does ripen perfectly, no grape of its season surpasses it in quality or value. It has been subject to disease of rot, etc., in some localities, but it is again renewing itself, and in sections where, a few years since, it was unprofitable, it is now one of the best. It has been more generally grown as a wine and table grape than any other, except, perhaps, the Isabella, and to-day holds supremacy in many localities. Except in sheltered or favored localities and in good seasons, it does not ripen well in Western New York. Bunch medium to large, loose; berries large, coppery red, with light bloom, round; flesh slightly pulpy at center, juicy, very sweet, musky, aro-

matic, rich. Ripens early in October, but will hang, and is improved, until weather becomes too cold. Keeps well during winter.

Delaware.—This in quality is one of our most delicate and best of native varieties. The vine is perfectly hardy, a healthy grower, requiring rich soil, has short-jointed wood, and bears abundantly, so much so, that, if long pruned, which is best, it should have more or less of its fruit thinned out. As a table-dessert grape, or for wine, it is one of the best. The bunch is small, compact, shouldered; berries small, round, clear, light red, almost translucent; free from pulp, sweet, vinous, aromatic.

Diana.—Originated in Boston, Mass. Vine vigorous, healthy, hardy, and productive, requires age to develop its true qualities. A thin, light, or poor soil is better suited to it than one over-rich. It hangs well after ripening, and is one of the best winter keepers among grapes. The bunches are large, compact; berry medium, reddish lilac; flesh juicy, nearly free from pulp, sweet, aromatic; colors early, but does not attain perfect maturity earlier than Catawba. A valuable table and wine grape where it ripens well. Supposed to be a seedling from the Catawba.

Goethe (ROGERS' No. 1).—Vine very vigorous and productive. Ripens with Catawba. Succeeds well South and South-west, or wherever the Catawba ripens perfectly. At the North and East, it does not ripen perfectly, except in sheltered, warm locations. Bunch large, moderately compact; amber flushed with red; flesh tender, melting, sweet, juicy, delicious.

Iona.—Originated by Dr. Grant. Vine moderately vigorous, hardy, productive. The fruit colors early, but does not really ripen much, if any, earlier than Catawba. It has been widely disseminated, but is not found successful as a vineyard sort, except in certain localities. Bunch medium to large, shouldered; berries medium size, round-

ish oval; light, clear red, thin bloom; flesh soft, tender, vinous, juicy, sweet, delicious. A grape of superior quality, and should be in every garden where the climate is suitable.

Lindley (ROGERS' No. 9).—Vine healthy; not as vigorous or strong grower as others of the Rogers seedlings; foliage rather sparse; a good bearer. Bunch medium, compact; berry medium, roundish, pale reddish; flesh sweet, tender, juicy, slightly aromatic. One of the best and earliest of the Rogers list.

Massasoit (ROGERS' No. 3).—Vine moderately vigorous, productive; bunch medium, rather loose; berry large, roundish, light, claret red; flesh tender, juicy, sweet; ripens just before Concord; is a desirable variety for the garden.

Mottled.—Originated with Charles Carpenter, Kelley's Island, O. Vine a healthy, moderate grower, with short-jointed wood, very productive; bunch medium, very compact; berry medium, round, mottled red; flesh juicy, rich, sweet, a little hard at center, vinous. An excellent grape for wine or table; hangs a long time on the vine, and keeps remarkably well.

Salem (ROGERS' No. 22).—Vine healthy, vigorous, and productive; bunch large, compact; berry large, round; dark, coppery red; flesh tender, juicy, slight pulp, sweet, a little foxy, aromatic. Ripens about same season as Isabella.

Walter.—Origin Poughkeepsie, N. Y. Vine hardy, healthy, vigorous, short-jointed, very productive; bunch medium, compact; berries medium, round, light red; flesh sweet, juicy, deliciously rich vinous. Ripens shortly after Concord. Promises to be valuable both for table and wine.

CLASS III.—WHITE GRAPES.

Allen's Hybrid.—Vine vigorous grower, not hardy, productive, liable to mildew, ripens early; bunch medium or above, pretty compact; berry medium, roundish, pale whitish yellow; flesh tender, juicy, sweet, slightly vinous, delicious. Rarely escapes destruction by mildew in Western New York.

Autuchon (ARNOLD'S No. 5).—Originated with Charles Arnold, Paris, C. W. Said to be a cross between Clinton and Golden Chasselas. Vine moderately vigorous and productive; bunch long, moderately compact; berry medium; greenish white, with a golden hue when fully ripe; flesh free from pulp, juicy, sweet, sprightly, and rich. Said to ripen with Delaware. New and but little known.

Croton.—Originated by S. Underhill, Croton Point, N. Y. Said to be a cross between Delaware and Golden Chasselas. Vine vigorous, very productive; bunch large, shouldered; berry medium or above, greenish yellow; flesh juicy, sprightly, sweet, rich, delicious. Ripens among the earliest, or about with Hartford Prolific. Promises to be a valuable garden variety.

Cuyahoga.—Origin Ohio. Vine vigorous, healthy, and productive, requires a warm soil and location at the North; mildews at the South; bunch medium; berry medium, greenish amber; flesh tender, juicy, vinous, sweet; when well ripened, one of the best. Ripens with Catawba.

Lydia.—Originated on Kelley's Island, O. Vine moderately vigorous, with rather sparse foliage, moderate bearer while young, good bearer when old and long pruned; bunch medium, short, compact; berry round, greenish white, amber yellow at maturity; flesh juicy, rich, sweet, very little pulp. Ripens with Delaware. One of the very best in quality.

Martha.—Raised by Samuel Miller, of Bluffton, Mo. Vine a vigorous grower and a good bearer, hardy and healthy; bunch medium; berry large, roundish, greenish yellow; flesh juicy, sweet, a little pulp at center. Ripens with Concord.

Maxatawney.—Originated in Pennsylvania. Vine vigorous, hardy, healthy, and productive. Ripens with Isabella, and is one of the best of the white grapes; bunch medium, rather loose, berries medium, roundish oval, greenish or yellowish white, tinted with amber; flesh free from pulp, tender, sweet, juicy, sprightly, delicious.

Rebecca.—Origin Hudson, N. Y. Vine a free but not strong grower, an abundant bearer, hardy in most localities; ripens soon after Concord, and deserves a place in every garden; bunch medium, compact; berries medium, greenish yellow, almost golden amber at full ripeness; flesh rather firm, juicy, sweet, delicious. When well ripened it is not surpassed by any of the native grapes.

SELECT FOREIGN GRAPES.

CLASS I.—BLACK OR PURPLE GRAPES.

Alicante (BLACK PALESTINE, etc.).—Bunch large, shouldered, compact; berries nearly round, black, with a little bloom; flesh tender, juicy, fine. An excellent late variety; hangs well.

Black Frontignan (MUSCAT NOIR, etc.).—Bunches long; berries medium size, round; flesh musky, rich; a good bearer.

Black Hamburgh.—One of the most popular, because well known and tested. It is an admirable grape, and a general favorite; bunch large, often double-shouldered; berries large, roundish, slightly oval; juicy, very sugary, rich.

Black St. Peter's.—Bunches large, long ; berries large, black bloom ; flesh tender, rich, and juicy. Late, and hangs a long time after ripe ; valuable.

Burckhardt's Prince.—Bunches long ; berries medium, deep black ; flesh firm, juicy, vinous.

Champion Hamburgh.—An excellent grape. Much like Black Hamburgh.

Duc de Magenta.—Bunch and berry large ; flesh juicy, rich ; ripens sometime before Black Hamburgh.

Early Black Bordeaux.—Bunches short, shouldered ; berries medium or above ; flesh tender, melting, rich, and sweet. One of the best early purple or black grapes known.

Gros Maroc.—Bunch large, compact, shouldered ; berries large, round, black ; flesh firm, sweet, vinous. A fine grower, and ripens well.

Jura Muscat.—Bunch large, shouldered ; berries above medium, oval ; flesh rich, flavored with a fine Muscat aroma.

Lady Downe's.—Bunches large, rather loose, shouldered ; berries above medium, roundish oval ; black, with a thin bloom ; flesh firm, sweet, and rich. One of the most valuable late varieties. Hangs a long time after ripening.

Muscat Hamburgh.—Bunches large and long ; berries large, roundish oval ; flesh juicy, rich, excellent ; flavor of Muscat of Alexandria. Requires good culture, but is of the highest quality.

Muscat Lierval.—Bunch medium ; berries round, medium size, deep purplish black ; flesh rich, sugary, with a slight Muscat flavor. Very early.

Muscat d'Aout.—Bunch and berries medium ; round inclining to oval ; flesh very rich and juicy. A good early grape.

Mrs. Pince's Black Muscat.—Bunches large, shouldered; berries medium size, oval, purplish black, thin bloom; flesh firm, sweet, vinous, with a Muscat flavor. A valuable new grape.

Trentham Black.—Bunches large, tapering, and shouldered; berries oval; skin tough, jet black; flesh juicy, rich, sugary, and vinous. Valued highly for the cold vinery.

CLASS II.—RED GRAPES.

Grizzly Frontignan.—Bunches large; berries large, round; skin thick, pale brown, blended with pink and yellow; flesh very juicy, rich, musky, high-flavored.

CLASS III.—WHITE GRAPES.

Bowood Muscat.—Bunch large; berries very large, bright amber color; flesh rich, juicy, sweet, fine Muscat flavor. A superb grape; sets and ripens tolerably well in cold vineries. Supersedes to some extent the Muscat of Alexandria and Canon Hall Muscat.

Buckland's Sweetwater.—Bunch large, shouldered; berries round, slightly oval; skin thin, amber color, with a thin white bloom; flesh juicy, sweet, delicious.

Chasselas Musqué.—Bunches medium size, long, loose; berries medium size, round; skin thin, yellowish white; flesh tender, very juicy, rich musky flavor. A delicious grape, highest flavored of the Chasselas. Sometimes cracks. Requires severe thinning.

Chasselas Royal.—Bunches short, compact, shouldered; berries round, large, pale amber when ripe. An excellent grape.

Decon's Superb.—Bunch and berry large. Truly a superb white grape.

Early Smyrna Frontignan.—Bunches medium, well formed, not shouldered; berries medium, round, bright amber; flesh juicy, melting, rich, and delicious. One of the earliest to ripen. Well suited to a cold vinery.

Early Silver Frontignan.—Bunch medium to large, shouldered; berries large, roundish oval, whitish silvery yellow; flesh melting, juicy, rich, agreeable. An early and productive sort. Very desirable.

Foster's White Seedling.—Bunch large; berries above medium, roundish oval, yellowish amber; flesh tender, melting, sweet, and rich flavored. A new variety, superior to Royal Muscadine; ripening at the same time.

Golden Champion.—Bunches large, heavily shouldered; berries very large, obovate or ovate, to almost round; flesh firm, very juicy, tender, and rich. A superb new variety.

Madelaine Royal.—Bunch medium; berries medium, roundish; flesh tender, juicy, excellent. One of the best early white sorts.

Primavis Frontignan.—Bunches large, long, shouldered; berries medium to large, round, amber color; flesh rather solid, tender, juicy, sweet, and rich. One of the finest of the early Muscat Chasselas family.

Royal Muscadine (CHASSELAS DE FONTAINEBLEAU, etc.). bunches large and shouldered; berries large, greenish white, becoming amber when fully ripe; flesh tender, rich, and delicious. An excellent old sort; still popular.

Syrian.—Bunches enormously large, with broad shoulders; berries large, oval; skin thick, tawny yellow, or amber when mature; flesh firm and solid, moderately juicy and sweet; bunches weighing nineteen and a half pounds have been grown.

Trebbiano.—Bunches large, broad, shouldered; berries

medium, roundish oval, whitish, with a delicate bloom; flesh firm, rich, sweet. A fine late grape.

White Frontignan.—Bunches medium, rather long, not shouldered; berries medium, round, dull white, or yellow, thin bloom; flesh tender, rich, perfumed, musky. An old and favorite variety, known under many names; so very hardy in its habit and uniform productiveness as to be widely grown and esteemed.

White Muscat of Alexandria.—Bunches very large, long, and loose, shouldered; berries large, oval, pale amber, with a thin white bloom; flesh firm, moderately juicy, sweet, rich Muscat flavor. An old, well-known variety; requires a high temperature to mature it thoroughly. It is from this that the Muscatel raisins are made. Succeeds well in the open air in California.

White Nice.—Bunch very large, shouldered, loose; berries medium, roundish, greenish white, becoming yellowish at maturity; flesh sweet, very good flavor. Bunches weighing eighteen pounds have been grown. It is very prolific.

SUB-TROPICAL FRUITS.

SECTION 16.—FIGS.

The culture of the Fig in all of the Southern States, California, and Utah is as easy as that of the apple in the Middle States, and it promises to become one of the profitable branches of fruit culture. In the North, they are easily grown in pots or tubs.

Adams.—Very large, turbinate, brownish purple; leaves very large; new. This is said to be the largest variety grown.

Angélique (ANGELICA).—Medium size, obovate; yellow,

dotted with long greenish white specks ; flesh white, tinged with red at the center. An abundant bearer.

Brown Ischia.—Medium size, roundish turbinate, light brown or chestnut-colored ; flesh purple, sweet, and high-flavored. An excellent bearer.

Brown Turkey.—Large, pyriform ; brownish red, covered with blue bloom ; flesh red and very luscious. Tree very hardy and prolific.

Brunswick.—Very large, pyriform, depressed at apex ; greenish yellow, with violet brown on sun side ; flesh tinged with red at center, rich and excellent. Tree one of the hardiest, and a capital bearer.

Early Violet.—Small, roundish, brownish red, covered with a blue bloom ; flesh red, fine flavored ; tree hardy and abundant bearer. One of the best for pots and forcing.

Pergussata.—Small, round, compressed at ends ; purplish brown, with pale spots in the sun ; flesh deep red, rich and luscious. Hangs a long time.

White Genoa.—Large, roundish turbinate ; skin thin, pale yellowish ; flesh red, excellent flavor ; only a moderate bearer.

SECTION 17.—ORANGES—CITRUS.

The cultivation of the Orange is now attracting more attention in Florida and Southern California, than it has ever done before. In some parts of Florida—the Indian River country, in particular—the crop rarely fails from any cause, and the fruit is of the finest quality. Where the soil is suitable, and proper care bestowed on the cultivation, an orange grove must be quite as profitable as the best of our Northern orchards.

The trees bear annually, come into bearing at four or five years from bud or graft, and continue to improve from year to year for a long period. They live to a great age under favorable circumstances—trees are recorded some 400 years old.

Previous to the extraordinary frost of 1835, there were single trees at St. Augustine that yielded annually about 40,000 oranges.

This, at the average price in the grove, two cents, would be \$800. A handsome income from one tree! The oldest groves now in Florida are twenty-five to thirty years old. The orange flourishes best in a rich calcareous soil. The most thrifty and fruitful plantations we saw, were on shell lands, which occur frequently in Florida—a dark, rich loam mixed with small shells. In the absence of shells, lime will no doubt be beneficial. The propagation is similar to other fruit-trees.

Stocks for grafting are either procured by raising seedlings of the Bitter or Wild Orange, which can be worked at the age of one or two years from seed; or plants may in some places be procured from the woods. In many localities in Florida, the Wild Orange abounds in the woods, and seems to be as much at home as though it were indigenous. The trees are planted in groves at twenty to thirty feet apart. It takes ten or twelve years to bring the trees to a really remunerative condition.

After the fourth or fifth year the crop will probably pay for cultivation.

VARIETIES.

There are a great many varieties in cultivation, introduced from China, Spain, and other orange-growing countries, but that grown in Florida, which was no doubt introduced by the Spaniards, has no superior. It is known as the

St. Augustine Orange, a variety of the Sweet Orange, in the markets, often sold under local names, such as "Mellonville," "Indian River," etc. It is a large, handsome fruit, with moderately thin skin, somewhat rough; pulp full of sweet, sprightly, delicious juice. It resembles the Cuba Orange, but seems to be larger and of better quality.

The Havana.—This is the most common in our markets and best known. A large, excellent fruit; quite similar to the preceding.

The Maltese, or MALTA BLOOD, has a thick and spongy rind; pulp red and delicious, but sometimes a trace of bitterness.

The Mandarin is a small, flattened fruit, thin rind, with a dark orange pulp; juicy and rich.

The Bergamot has small flowers and pear-shaped fruit; very fragrant, and much used by perfumers.

The Variegated-Leaved is a variety with variegated foliage; ornamental.

The Shaddock (*Citrus decumana*) is a fruit of great size, striking in appearance, but not of value, except for confectionery.

The Tangerine is small, sweet, and rich; very prolific. One of the best for pot culture.

The Otaheite is a small variety, a dwarf growing kind; blooms and bears abundantly when not over a foot high.

The St. Michaels is a medium-sized fruit, pale yellow, with a thin rind, very delicious, and tree an abundant bearer. Chiefly grown in the Portuguese island St. Michael.

The Myrtle-Leaved (or CHINESE) is a small fruited variety, a dwarf tree; more curious than profitable.

Beside these are the *Egg*, *Embigo* or *Navel*, *Silver*, *Pernambuco*, *Exquisite*, *Du Roi*, *Excelsior*, *Prolific*, *Dul-*

cississima, and several others recently introduced, some of which may prove to be valuable.

LEMON AND LIME.

The Lemon (*Citrus Limonium*) is not as hardy as the orange, and is improved by being worked upon the bitter-orange stock. There is an Italian variety which is sweet.

The Lime (*Citrus Limetta*).—Several varieties in cultivation. That commonly grown is a profuse bearer. Hedges are formed of it in the West Indies. It is grown extensively in California, and is very profitable. It is used for the same purpose as the lemon, and for preserves.

THE POMEGRANATE.

The Pomegranate is a native of China and the south of Europe, and its culture in our Southern States and California is perfectly successful. It is a low, deciduous tree, with long, narrow leaves. The fruit has a very refreshing, sweet, rather acid pulp, and its singular and beautiful appearance makes it a welcome addition to the desert. The tree is propagated like other fruit-trees, by seeds, layers, cuttings, graftings, etc., and grows readily in any ordinary good garden soil.

The varieties known as the best are the *Sweet-fruited*, with sweet and juicy pulp; the *Sub-acid-fruited*, which is the variety commonly grown in gardens; the *Violet*, which is a large and late variety, and the *Wild* or *Acid-fruited*, with a sharp acid flavor.

The Pomegranate is also a highly ornamental shrub, and its varieties with double red and double white flowers are especially attractive and desirable.

THE PAWPAW OR CUSTARD APPLE.

The Custard Apple, a variety of which, *Asimina triloba*, commonly called Pawpaw, is a native of Kentucky, Southern Ohio, etc. It is a small, deciduous tree, easily propagated by seeds or grafting.

The Custard Apple of Peru and other tropical countries (*Anona cherimolia*) is described as a superior fruit, and highly esteemed for the dessert. The *A. palustris*, *A. squamosa*, and *A. muricata* are esteemed West India varieties.

FOURTH DIVISION.—ALMONDS, CHESTNUTS, FILBERTS, AND WALNUTS.

SECTION 18.—ALMONDS.

Sweet Hard-shell.—This is a hardy and productive variety, succeeding well in the climate of Western New York, and still farther North. Nut very large, with a hard shell and a large, sweet kernel; ripe here about the first of October. The tree is very vigorous, has smooth glaucous leaves, and when in bloom in the spring is more brilliant and showy than any other fruit tree.

Soft Sweet-shell, Ladies' Thin-shell, etc.—This is the almond of the shops, of which such immense quantities are annually imported from abroad. It and all its sub-varieties, as far as we know, are too tender for our Northern climate, unless carefully grown on a wall or trellis, and protected. South of Virginia, we believe, it succeeds well; and so beautiful a tree, and so estimable a fruit, deserve the attention of all fruit-growers. Very successfully grown in California.

The Bitter Almond.—This is hardy and productive; nut

similar to the first-named in appearance, but bitter, and only useful in confectionery or medicine. Its chief product is the prussic acid of the druggists.

SECTION 19.—CHESTNUTS.

The American or Common Chestnut is well known as one of our most beautiful forest-trees. It is seldom grown as a fruit-tree, although the fruit is highly esteemed. It should have a place in all large collections of standard fruit-trees. It reproduces itself from seed.

The Dwarf Chestnut, or Chinquapin, is a small tree eight or ten feet high, and very prolific, but the nuts are small. It grows spontaneously in Maryland, Virginia, and southward.

The Spanish Chestnut or Marron.—This is the large, sweet nut, as large as a horse chesnut, imported from abroad. There are many varieties cultivated in France and England, but that designated by the French as "*Marron de Lyon*," is the best. It is propagated by grafting on the common sorts. It is not reproduced truly from seed, but its seedlings produce large and fine fruits. It bears and ripens well as far north as Rochester. It bears the second year from the graft and the fourth from seed.

SECTION 20.—FILBERTS.

1. **Cosford.**—This is an improved variety of the English hazel-nut, very prolific, nut large, oblong, or oval; shell thin, and kernel fine-flavored.

2. **Coburg.**—Large and fine, and a most abundant bearer.

3. **Dwarf Prolific.**—One of the most prolific bearers,

nut rather small. We have plants two feet high bearing well; kernel good.

4. **Frizzled.**—Remarkable for its curious frizzled husk, a good bearer, and one of the finest flavored.

5. **Red-Skinned.**—One of the old standard sorts of the English growers, distinguished by the bright red or crimson skin of the kernel; medium size, egg-shaped, shell thick, flavor good.

6. **White.**—This is also an old standard sort; the kernel is a yellowish white. Both this and the preceding have long husks.

SECTION 21.—WALNUTS.

The English or Madeira Nut (*Juglans regia*).—This is a native of Persia. A lofty, spreading tree, with pinnated leaves like the butternut, and the fruit nearly as large. Great quantities are annually imported, and sold in the fruit shops.

The tree is tender while young, the ends of the young shoots being injured in winter at the north, but as it grows older it becomes hardier. It is produced from seed or by grafting. There are many varieties of it cultivated abroad, few of which have yet been introduced here on account of the little attention given to this class of fruits. Is now being extensively planted in California, where it succeeds well.

The Dwarf Prolific Walnut (*Juglans præparturiens*) is a French variety, most desirable for the garden. It bears at the age of three years from the seed, and often at the height of two to three feet.

Our native sorts, the Black Walnut (*Juglans nigra*), the Butternut (*Juglans cinerea*), the Hickory-Nut (*Carya*), and its varieties, are all well-known trees that

deserve much more attention than they receive, considering the value of their timber as well as fruit.



CHAPTER II.

GATHERING, PACKING, TRANSPORTATION, AND PRESERVATION OF FRUITS.

THIS is a branch of the general subject of fruit culture and management that requires the most careful attention; for it is quite useless to take pains in producing fine fruits, without taking equal pains in gathering, preserving, and sending them to the table or the market in a sound, sightly, and proper condition. Very few fruit-growers seem to appreciate this part of their business. Fruit-dealers at home and abroad complain of the careless and slovenly manner in which our fruits are gathered, packed, and presented in the market, and would gladly pay a double price for them in a better condition. The first consideration is:

The period of maturity at which fruits should be gathered.—The stone fruits generally are allowed to reach perfect maturity, or within four or five days of it, on the tree.

In moist, cool seasons, particularly, they are benefited by being gathered a few days before maturity, and allowed to ripen in a dry, warm room; they part with the water contained in their juices, which thus become better elaborated and more sugary and high-flavored.

Summer Pears, too, on the same principle, require to be gathered, as a general thing, from a week to a fort-

night before their maturity. Sweet varieties, and such as are inclined to become *mealy*, are entirely worthless when ripened on the tree, and many very excellent varieties are condemned on this account. Such as these should be gathered the moment the skin begins to change color in the least degree.

Summer Apples, too, and especially those inclined to *mealiness*, should be picked early; as soon as the skin begins to change color, otherwise they part with their juices, and become worthless. Ripeness is indicated by the seeds turning dark-colored, and by the stem parting readily from the tree when it is lifted upwards.

Winter Apples and Pears should be allowed to remain on the trees as long as vegetation is active, or until frosts are apprehended.

Grapes, Berries, etc., are allowed to attain perfect maturity before being gathered.

Chestnuts, Filberts, etc., are not gathered until they begin to fall from the tree.

Mode of Gathering.—Unless it be a few specimens wanted for immediate use, which may be taken with some of the contrivances mentioned under the head of implements, all fruits should be gathered by *the hand*. The branch to be gathered from should be taken in one hand, and the fruits carefully taken off, one by one, with the other, with their stems attached. (For fruits neither keep so well, nor look so well, without the stems.) They are then laid carefully in single layers in broad, shallow baskets, the bottoms of which should be covered with paper or moss, to prevent bruises. Peaches and other soft fruits should be pressed as lightly as possible, for anything like a squeeze is certainly followed by decay in the form of a brown spot, and this is the reason why it is so exceedingly difficult to find a perfectly *sound* and at the same time *ripe* peach in our markets.

When more than one layer of fruit is laid in the same basket, some soft paper, dry moss, hay, or other material, ought to separate them, for it is difficult to place one layer immediately upon another, and especially if the fruits are approaching maturity, without bruising them more or less. Fruit should only be gathered in dry weather, and in the dry time of the day.

Disposition of the Fruits after gathering.—When they are thus in the baskets, if summer fruits, they are either carried into the fruit-room and arranged on shelves or tables in thin layers, or they are carefully transferred, one by one, into market-baskets and carried to market on an easy spring wagon, if not by steamboat or railroad, by which jarring or jolting will be avoided. Treated in this manner, they will be in a marketable condition, and one basket will sell for as much as four, carelessly picked, thrown into baskets, and tumbled out of them into a barrel or wagon-box.

Ripe fruits may be kept in good condition for a considerable period of time, in an ice-house, or in some of the recently-invented fruit-preservers, and even in very cool, dry cellars. The vessels in which they are deposited should be perfectly clean, that no unpleasant flavor may be imparted to them. Peaches have been sent to the East Indies, by being properly packed in ice; and it may be that methods of packing and preserving will, before long, be discovered, that will give us access to the markets of other countries, even for our perishable summer fruits. We have seen Seckel pears in a very good state of preservation in January. The science of ripening and preserving fruits is but in its infancy, and horticultural societies that have the means will be doing a great public service by offering liberal premiums that will incite to experiment on the subject.

Winter Fruits intended for long keeping are transferred

by hand from the baskets in which they are gathered on the tree, into larger ones in which they can be carried into a dry, cool room, where they are laid in heaps, which may be three or four deep, where they may remain for a couple of weeks, during which time they will have parted with considerable moisture and be quite dry. They will then be fit for packing.

Clean, new barrels should be procured, and the fruits should be carefully assorted. For shipping to distant or foreign markets, *the best only* should be selected; all bruised, wormy, knotty specimens being laid aside for home consumption. They are then placed in the barrels, by hand, arranged regularly in layers, so that no spaces will exist, by which the fruits may shift, roll, or knock against one another. The barrels are then tightly headed up, so that the head presses firmly on the fruits; some people recommend placing a layer of clean moss or soft paper, both on the bottom and top of the barrel; but this is not necessary where the packing and heading are performed carefully. After packing, the barrels must be sent to market in such a manner as never to be jolted or rolled, any more than they would be on men's shoulders, or an easy spring wagon or sled, or by a water conveyance.

On shipboard, the barrels should be placed in the coolest and driest place. It is perfectly idle to gather, pack, or ship fruits in any other way than this to foreign markets. American apples are frequently sold in Liverpool at auction for half what they would have sold for in New-York, on account of their bad condition. I saw this in 1849, when Newtown pippins were selling at twelve and a half cents apiece in the fruit-shops.

Winter fruits for home consumption should be carefully assorted, keeping the best, the poorest, the sound, the bruised, and the earlier and later ripening varieties all separate; when sound and bruised, early and late, are

all thrown together promiscuously, they cannot fail to decay speedily and to lose their flavor; for two or three decaying apples in a heap or barrel will taint the flavor of all, and hasten the decay of those around them. This arrangement into grades and classes is, therefore, absolutely necessary even for the fruits needed for family use; and when they are so arranged, the sound, long-keepers are put into clean, new barrels, carefully, by hand, and the barrels headed up tightly and placed in a cool, dry cellar or fruit-room. The bruised ones can be laid in a place by themselves for immediate use. Every barrel, when packed, should be marked.

Winter Pears, as a general thing, require to be brought into a warm temperature one or two weeks before they are wanted for table use. All the baking and stewing, and even many of the table varieties, may be treated exactly like apples.

PACKING, MARKING, SHIPPING, ETC.

In all that relates to the labor of preparing fruits for market, great care is requisite, and we cannot do better than to copy the following very concise and practical directions prepared by a large and experienced shipping-house from long observance of the requisites needed for success :

"Packing.—In packing Apples, Pears, Berries, etc., do not face your fruit more than it will bear, for if a buyer is once deceived in buying a mark of fruit, he will discount the mark in buying again, or refuse to buy it at all ; while if it runs *uniform*, and gives satisfaction, it is eagerly sought after, and the seller can get increased price by the competition. Also bear in mind that good fruit, etc., well put up and reaching here in good order, always sells, even when the market is glutted ; while fruit, etc., poorly put

up, can sometimes be scarcely given away, thereby causing dissatisfaction to the shipper on account of poor returns, and disgust to the receiver, because they have had to sacrifice it, when a little pains taken with the article would have caused a different result. Nothing is gained in packing *fruit*, etc. (which is sold by the package), in short packages, that is for barrels to be less than flour-barrel size, or baskets to hold twelve or fourteen quarts, when they should hold half a bushel, or in boxes less than measure intended. If fruit is too ripe or soft to pack in full-size packages, pack in those of half or even quarter-size, but by all means give full measure, and try to pack your packages so tight that, upon arrival, they will open full and not look as though there was not enough of the article to fill them. Besides fruit, etc., will come a longer distance and arrive in far better order, by being packed full, even to slight jamming, than if packed loose. With the rough and severe handling, that all packages get more or less, the articles are very likely to be badly bruised in coming. All packages should be neat and clean; and barrels, boxes, and crates sold with the articles should, if possible, be new, as the package helps show the contents to better advantage, and will sell the better from the evident pains bestowed upon it.

“*Marking*.—Always mark each package plainly and neat, with the name or initials of consignor, and the net weight or count of contents of each.

“*Shipping*.—All perishable fruits, such as peaches, plums, berries, etc., should be sent by the quickest conveyance. Receipts should be taken from transportation companies. Advices, with a full and correct invoice, should be sent by mail. A duplicate invoice should be put in one of the packages, marked *Bill*. There is nothing so vexatious to a commission house, as the receipt of consignments not properly or distinctly marked, and no advices of the same.

“*Handling*.—All fruit, of whatever kind, should be handled with the greatest care, so as not to bruise it, even slightly, as oftentimes where a little bruise does not show when fruit is packed, in ten or twelve hours afterwards the article is half, if not totally destroyed, causing the fruit in contact with it to also decay, and injuring the sale of the same, as buyers will discount imperfect or decayed fruit. Great care should also be taken in handling the packages after fruit is packed, as a blow or fall will penetrate through the entire package, bruising the contents oftentimes badly.

“*Apples*.—Assort those uniform in size and quality, pack in clean barrels; take out one head, commence packing by placing a tier of apples with their ends to the closed head of the barrel, then fill up without bruising the fruit, shake down thoroughly, and fill the barrel so full that the head must be pressed in with a lever, flattening the last tier of apples, and even starting the juice. Nail the head and hoops with four-penny nails, turn the barrel over, and on the head not opened mark plainly the variety in each barrel. Apples packed in this way show a fine, handsome face when opened.

“*Pears*.—This delicate fruit must be packed and shipped when it is fully matured and before it has ripened, so as to insure arrival in good order. Pears are not as elastic as apples. Line the sides, top, and bottom of the barrel or package with straw-paper, to prevent the fruit being stained by the wood of the barrel or package. Assort and pack same as apples, except placing the blossom-end of the fruit upon the end not opened. When the barrel is full, press the head in firmly without starting the juice. Summer Pears, if over two days on the way, should be ventilated, otherwise the package should be tight, as the fruit will ripen more uniformly and hold its color better.”

Packing Pears for Distant Markets.—The French send

away more pears to foreign markets than any other people. Some small importations of their winter sorts have actually been made by some of the New York fruit-dealers. They pack them in small boxes, either round or square, such as a man can lift and carry easily in his hands.

They cover the bottom and sides with very dry moss or soft, dry paper, well calculated to absorb moisture. They then wrap each fruit in the dry, soft paper, and lay them in layers, the largest and least mature in the bottom, and fill all the interstices with dry moss or paper. I have seen these boxes opened in London, in the finest condition, after being packed a month. They are so tightly packed that the slightest movement cannot take place among them, and yet no one presses upon another. The dry moss and paper that separate them, absorb any moisture; and if one decays, it does not affect others.

Some of the Paris confectioners and restaurant-keepers preserve fruits very successfully in barrels, packed in layers, and the interstices filled up with powdered charcoal. The barrels are kept in a dry, cool place, about forty degrees, where they are not subjected to changes of temperature. Apples, pears, grapes, almonds, nuts, and potatoes, are all preserved in this manner.

“*Peaches*.—Pack in stave baskets holding half of a bushel; they are firmer than splint baskets, and protect the fruit better. Sort uniform as to size and quality. Fill your baskets rounding full. Tie a cover over the top of the basket, so that the fruit will not be liable to shake. Or they can be packed in slat crates holding a bushel, with a partition across the crate at an equal distance from each end.

“*Quinces*.—Sort to run uniform, pack in barrel same as apples, except that the blossom end of the fruit should be placed to the end not opened. When the barrel is full, press in head harder than for pears, but not as tight as apples.

“*Strawberries*.—All large berries should be packed in quart boxes or baskets, twenty-four or thirty to the crate. In filling the boxes, put in berries of uniform size, rejecting all soft ones; face the box with nice fruit, and fill it rounding full, so that when packed in crates the upper box will slightly press the fruit in the lower box. The small varieties of strawberries can be packed in a little larger crate, or packed in half-bushel drawers, four drawers to a stand.

“*Raspberries* should be packed in a quart box or basket. The fruit should be carefully picked, boxes well filled, and packed in crates of twenty-four and thirty quarts.

“*Currants* can be packed in half-bushel or bushel drawers, and equally as well in baskets; and when filled should be well rounded.

“*Cherries*.—Same as currants; but think a clean half-bushel basket preferable, with a paper or cloth cover. They should be well packed.

“*Blackberries*.—Pack in boxes holding a quart or pint—twenty-four or thirty-six quarts to a crate. Fill and sort the same as strawberries. When the crate is full, place a sheet of straw-paper over the upper row of boxes, so that it will exclude the air and help retain the *color* of the fruit.

“*Plums*.—The fancy kinds should be packed in small boxes or fancy baskets; while the common kinds can be packed in half-bushel or bushel boxes or baskets, the same as peaches.” They sell best in small packages.

Grapes, when fully ripe, should be taken, a single cluster at a time, and all imperfect berries cut from the bunch. They can be packed in three, five, six, ten, or twelve-pound boxes; or if going but a short distance, in clean baskets of ten to twenty pounds, and covered with a cloth. In packing, take off the cover of the box, line the inside with thin white paper, commence filling with whole bunches, pack close as possible without jamming, fill up

with bunches, parts of bunches, then single grapes, but with a stem, so that all space is occupied, and the fruit projects from the top, from a quarter to half an inch. Turn over the paper used in lining, nail the cover-points down, reverse the box, and paste a label, stating the variety of the grape, on the cover that was not opened.

Fruit-Rooms.—A fruit-room is a structure set apart exclusively for the preservation of fruit. Its great requisites are, perfect security from moisture or dampness, exclusion from light, and a uniform temperature. If these points are obtained, no matter where, how, or of what material the fruit-room be constructed. It may be built of stone, brick, clay, or wood, above or below ground, as circumstances or taste may dictate.

A good, dry, and cool cellar is as good a place for keeping fruit as can be provided; but the great objection to cellars used for other purposes is, that currents of air are frequently admitted, and too much light, by which the temperature is changed, decay promoted, or the fruits dried and shriveled. There are, also, other objects that unavoidably saturate the air more or less with moisture.

Where a fruit-room is built on the surface of the ground, it should be on the ice-house principle of double walls and doors, to prevent access of either heat or cold from without. A good cellar or cave, built in a dry, sandy, or gravelly bank, or side-hill, will answer every purpose. The walls may be of stone, brick, or timber; the roof should be thick, with a slope sufficient to throw off water freely, and the earth about should also be so graded, that water will flow away as fast as it falls. Provision may be made for lighting and ventilating in the roof, and the door or doors should be double.

The interior should be fitted up with shelves and bins, with places for barrels or other articles, in which fruits are packed.

A cheap and effective fruit-house has long been a desideratum, and many patents have been obtained. The majority of them, however, have proved failures, and oftentimes expensive ones. The best house we have seen is that of Rees & Houghton, Philadelphia, Pa., from whose circular we extract the following :

“When the purity of the atmosphere is obtained by excessive ventilation, not only is the temperature of the apartment increased, but the ice is melted with great rapidity. To dry the atmosphere by the use of absorbents is also a very expensive and troublesome process.

“In a room cooled to 38° Fahrenheit, and kept perfectly dry, the decomposition of fruit is very slow. Fruit may be kept sound and good for three or four months, or longer. The cooler the house, the drier it will naturally become, but when the natural tendency is aided by philosophical construction, it will be perceived that the object may be more easily accomplished.

“Decomposing organic matter will of course throw off, and, in fact, generate moisture ; but when the process of decomposition is reduced to the lowest point, or suspended altogether, then less moisture will be present.

“The foul gases, or odors, emanating from decaying vegetables being volatile, are easily removed ; but the removal of moisture, or aqueous vapor, is more difficult.

“The last difficulty—the removal of moisture, without the use of artificial absorbents—has been overcome by this invention, in the most perfect manner, without any expensive machinery, or any daily cost in working the house.

“The apparatus can be applied to large or small rooms, or even closets and refrigerators, with equal ease and success ; and from the very nature of things, being based upon the strictest natural laws, is the only plan that can produce the desired results, without the use of absorbents or driers.

“Fruit, in a state of moist decay, on being put into the

fruit-room, directly becomes dried to such a degree that all the moisture on the decaying spots disappears, and the spots themselves become covered with a dried pellicle-like court-plaster, and the rot ceases. The drying process, however, is not such as to produce shriveling in apples or pears, for the reason that only the external moisture is removed, and the interior flesh of the fruit remains unchanged.

“In this connection may be demonstrated the fallacy of the common idea that fruit just gathered from the tree must undergo a process of *sweating* before it is fit to be put into the cellar or fruit-room. The simple truth is, that fruit which has been *cooled* by any means will always *sweat* when it is brought into a warm atmosphere, not because the juice passes out of it, but because the moisture in hot air always *condenses* on a cold surface. On the contrary, fruit taken from the tree, on a warm day, and put immediately into a cold fruit-room, *never sweats*. The process of sweating in apples and pears may be repeated a hundred times by cooling the fruit in a cellar, and then bringing them suddenly into a hot room. A cold apple will always sweat in hot air.

“The ordinary working temperature obtained by means of ice, is about 38° to 40° Fahrenheit. But by the use of suitable apparatus, with salt and crushed ice, as in the ice-cream freezer, a room may be cooled below the freezing point.”

Attention to Fruits in the Cellar or Fruit-room.—The decay of fruits is caused either by bruises or by a fungus, or species of mildew, that increases rapidly and attacks all the sound fruits within its reach. It is, therefore, necessary to examine fruits frequently, and remove all that show any symptoms of decay, before they have either affected others or tainted the atmosphere of the room.

CHAPTER III.

DISEASES AND INSECTS.

SECTION 1.—DISEASES.

The Fire-Blight of the Pear, Apple, and Quince.—This is one of the most formidable diseases to which fruit-trees are liable. Whether it is caused by the sun, the atmosphere, or an insect, remains in doubt, some cases favoring one opinion, some another. It attacks the trees at different periods of the growing season, from June to September, and generally in the young parts first; the leaves flag, the sap becomes thick and brown, oozing out in globules through the bark, and emitting a very disagreeable odor, and the diseased branch or part turns black, as if it were burned by fire. When the pear-tree is attacked it is difficult to save it, the disease spreads so rapidly. In the apple and quince it is less fatal, rarely killing more than a portion of the tree even if left to its own course. The only remedy is, to cut away instantly the blighted parts, into the sound wood, where there is not the slightest trace of the disease, and burn them up immediately.

It is thought by some that young trees growing very rapidly are more subject to it than older trees growing slowly; and that warm sunshine, with a sultry atmosphere after rain, is apt to be followed by much blight. We have always regarded the cases favoring such an opinion as accidental.

Twig Blight.—This attacks the young shoots of the current season's growth on apple, pear, quince, mountain ash, etc., causing them to suddenly wither and become

brown at early or mid summer. The cause is unknown and the injury is not materially great. The remedy is in cutting away at the first appearance. In this season, 1871, it is more abundant than ever before.

Apple Blight.—This is a disease of serious character, inasmuch as it invades and destroys many orchards. Like the dreaded fire-blight of the pear, there seems no preventive. It attacks a whole branch or limb, and sometimes one quarter to one half of the top is destroyed, ere to the common observer it is apparent. No remedy is known except to cut away and destroy the memento of one's losses.

Bitter Rot.—This disease, by some attributed to want of appropriate nourishment to the tree, and by others to a fungous growth, is as yet but little understood. High culture, the application of lime to the soil, etc., are recommended as remedies.

Rust, or Fungus, Mildew, and Cracking.—This disease is more general in the pear than the apple, and it is more apparent and destructive on some varieties than upon others; yet these varieties have not been so closely observed and noted as to make it safe to enumerate them. Suffice it that varieties longest in cultivation, most productive, and in confined situations, are most liable to it. It appears to be a fungous growth, presenting, when viewed by the microscope, a mossy, spongy character, occupying the skin, so as to prevent the development of its tissues, and results in checking the growth at that point, thus creating a deformity. When the malady spreads, as it sometimes does, over a half or more of the fruit, it tends to a deeper nature, and causes the fruit to crack open, and become corky and worthless. During a week in the early part of June, this year (1871), this disease appeared among pears in some localities to an alarming extent, but soon ceased to spread.

Pear-leaf Blight.—This disease has already been alluded to in treating of pear seedlings. It is a sort of rust that appears on the leaves in July or August, first as small brown spots; these spread rapidly over the leaves until they are completely dried up and growth stopped. It appears in a certain spot as a center, from which it spreads. Whether it be an insect, a fungus, or some atmospheric cause that produces this blight, is unknown. Certain cases favor one or other of these opinions. More minute investigations are wanted on the subject.

To avoid its evil effects as far as possible, the great point is, to get a rapid, vigorous growth, before mid-summer, when it usually appears. Seedlings grown in new soils do not appear to be so much affected as in old. Where stocks are affected very early in the season, they become almost worthless, on account of the feebleness produced in both stem and roots by such an untimely and unnatural check. Some *special* applications, such as coal cinders, iron filings, copperas, etc., have been suggested, but no evidence has yet been produced of their efficacy.

The Gum in Stone Fruits.—The cherry, plum, apricot, and peach are all more or less subject to this malady. The cherry is particularly liable to it in the West. It is produced by different causes, such as a wet soil, severe pruning, pruning at an improper time, violent changes of temperature, etc. The gumming of the Cherry in the West is considered by some to be owing in a great measure to the bark not yielding naturally to the growth of the wood, and hence they practise longitudinal incisions on it. The cherry-tree has a very powerful bark, and in some cases it may not yield naturally to the expansion or growth of the wood. We have seen about a foot of the trunk of a cherry-tree several inches smaller than the parts both above and below it. The bark was as smooth as glass on it, the first rind being unbroken, whilst on the large parts this was quite rough. This was a case arising

from the obstinacy of the bark, and could only be remedied by longitudinal incisions on the small part.

It is most probable that the extent and severity of this disease in the West is owing to violent changes from a hard frost to a bright sun and rapid thaw, by which the sap becomes deranged, and accumulates in masses. Trees that are branched near the ground will be less likely to suffer than those with tall, bare trunks. Where it has made some progress in any tree, pare off the diseased bark, clean off all the gum, and let the surface dry up; then apply a plaster of grafting composition, or a solution of gum shellac in alcohol, put on with a brush.

When the stone fruits are pruned severely in the spring, the sap does not find sufficient vent; it accumulates in masses and bursts the bark. This fact should always be kept in view in pruning, and a sufficient supply of active buds be left to absorb the sap.

The Yellows in the Peach.—This is supposed to arise from negligent cultivation. It exhibits itself in a yellow, sickly foliage, feeble shoots, and small fruits prematurely ripened. It is said to be contagious. Trees exhibiting these symptoms should instantly be destroyed. To avoid it, propagate only from trees in perfect health and vigor.

Mildew on the Peach.—The young shoots, leaves, and even the fruit of certain varieties, and especially the glandless ones, such as *Early Anne*, *Early Tillotson*, etc., are attacked by this. The only remedies are, to give the trees a dry, good soil, that will keep them in a vigorous condition, and to syringe freely twice a day when it begins to appear. The gooseberry suffers seriously from the mildew, owing mainly to the heat of our summers. In Northern New York, in Maine, Vermont, and Lower Canada, the finest large English varieties are brought to greater perfection than in warmer districts, and with good culture almost come up to the English standard. In a cold, damp-bottomed soil at Toronto, almost on a level

with Lake Ontario, fine crops are produced with comparatively little difficulty from mildew or rust. This would indicate as a remedy, a cool soil and situation, and mulching the roots to keep them cool. The plants should be renewed every three or four years, and they should be kept vigorous by liberal manuring and good culture.

Rot and Mildew of the Grape.—Both the rot and mildew on the grape have been attributed to various causes, none of which seems to prove reliable. Both diseases seem to come and go with seasons, now here and there excessive upon one variety one season, and another the next, evidently to us bearing the impress that it is miasmatic or sporadic, and developed according to the atmosphere and condition of the vine as regards health and vigor. The preventive seems to be in the free use of sulphur, by dusting the vines and keeping the influence of the sulphur thereon, from the time the seed is formed until the coloring is at least half-completed.

The Plum-tree Wart or Black-Knot.—The cause of this disease is still a matter of doubt and uncertainty. Some hold to the opinion that it is a gall produced by an insect, others that it is of fungous origin. The latter opinion is entitled to the greatest weight. We do not believe that insects have any agency whatever in producing this disease. Cions should never be taken from a diseased tree.

Cutting out the diseased branch clean to the sound wood, the moment the knots begin to appear, is an effectual remedy, and they should all be burnt up. We have saved trees six inches in diameter, that were affected on the trunk so seriously, that one third of its thickness had to be removed to get below the disease. After it was cut out, we applied a plaster of grafting composition, covered it with a cloth, and in two years it was all healed over and sound.

Plum-trees are so neglected in the country, that multitudes of them are now standing literally loaded with

these warts—not even an inch of any branch free from them, the most disgusting objects in the way of fruit trees that can possibly be imagined.

The Curl of the Leaf in the Peach.—This disease causes the leaves to assume a reddish color, to become thick, curled, and deformed, and finally to perish. It is supposed by many to be caused by insects; but it is really induced by a sudden change of weather. In proof of this we may adduce the fact that peach-trees under glass are never affected with this disease; and the more sheltered the position is, the less is the injury.

A number of warm days, that cause the expansion of the young leaves, followed by a cold rainy day, is almost sure to produce it to some extent; and the more severe and protracted the cold, the more extensive and fatal it is. The peach-trees in Western New York suffered more from this in 1849–50 than in the ten years previous, owing to a protracted cold time in each season after the young tender leaves had expanded. In both these seasons the check was so severe, as not only to produce this disease in its worst form, but the *gum* also; for the sap not being absorbed by the leaves, became stagnant, sour, and corroded, and burst the bark. Trees in sheltered gardens suffer less than those in exposed orchards. There is no possible way of guarding against this; and the only remedy known to us is, to pick off the diseased leaves the moment the weather changes, that new healthy ones may be produced.

SECTION 2.—THE PRINCIPAL INSECTS INJURIOUS TO FRUIT TREES.

Aphis or Plant-Louse.—There are several kinds of these. The two most troublesome to fruit trees are the green and black, small soft insects that appear suddenly in immense quantities on the young shoots of the trees, suck their juices, and consequently arrest their growth.

The apple, pear, and cherry are especially infested with them. They multiply with wonderful rapidity. It is said that one individual in five generations might be the progenitor of six thousand millions. Were it not that they are easily destroyed, they would present an obstacle almost insuperable in the propagation and culture of trees.

There are many ways of accomplishing their destruction. Our plan is to prepare a barrel of tobacco juice, by steeping stems for several days until the juice is a dark brown, like strong beer; we then mix this with a solution of soft-soap, or soapsuds. A pail is filled with this, and the ends of the shoots where the insects are assembled are brought down and dipped into the liquid. One dip is enough. Such parts as cannot be dipped are sprinkled liberally. It is applied to the heads of large trees by means of a hand or garden syringe. It should be done in the evening. The liquid may be so strong as to injure the foliage, hence it will be well for persons using it the first time to test it on one or two subjects before applying it extensively. This application must be repeated as often as any of the aphides make their appearance. The dry weather of mid-summer is generally the time most favorable for their appearance. The season of 1871 has been remarkable for the prevalence of this pest all over the country, not merely on fruit but on forest trees. It has been so in Europe also.

The Woolly Aphis or American Blight.—This is a small insect, covered with a white woolly substance that conceals its body. They infest the apple-tree in particular, both roots and branches, living upon the sap of the bark, and producing small warts or granulations on it by the punctures. They are more particularly troublesome on old rough-barked trees, as they lodge in the crevices, and are difficult to reach. The wind carries them from one place to another by the light down in which they are enveloped, and thus they spread quickly from one end of

a plantation to the other. Not a moment should be lost in destroying the first one that makes its appearance. Where the bark is rough it should be scraped smooth; if the roots be affected the earth should be removed, and every part washed, and every crevice filled with the following preparation, recommended in Harris's Treatise: "Two parts of soft-soap and eight of water, mixed with lime enough to bring it to the consistency of thick white-wash, to be put on with a brush." A solution of two pounds of potash in seven quarts of water will answer as well. Fresh earth should be put upon the roots.

The Scaly Aphis or Bark-Louse.—This is a dark-brown scale insect, that infests the bark of the apple-tree. They are of a dark brown color, just like the bark, and are not easily seen unless looked for. They attach themselves closely to the bark, and sometimes are so numerous as to form a complete coating. They seldom appear on thrifty-growing trees in good soil; but where the soil is damp and cold, and the trees growing feebly, this insect may be looked for. June is the time to destroy them, when they are young. At other times they are hard, and able to resist any ordinary remedy. The same application recommended for the aphis, applied to them with a hard brush, will effect their destruction. Where they have been left for a long time undisturbed, and have pretty well covered the tree, the quickest and best remedy is *to destroy tree and all*, unless it possesses some extraordinary claim for indulgence. Harris mentions a reddish brown bark-louse found on his grape-vine, arranged in rows one behind another in the crevices of the bark.

The Apple-tree Borer is a very troublesome insect in some sections of the country. In Western New York we have never met with it but in two or three instances, in very old, neglected orchards, that had stood for twenty years in grass. The beetle is striped brown and white, and is about three-fourths of an inch long. It deposits its

eggs in June, in the bark of the trees near the ground. Here the larva is hatched, becoming a whitish grub, which saws its way into the tree, perforating it in all directions, sometimes completely girdling it. The most effectual method to destroy them is, to insert the end of a wire into their burrow, and killing them. The same means are taken to guard against them as against the peach-tree grub, viz., placing a mound of ashes around the base of the trunk in the spring, and allowing it to remain until after the season in which the beetles deposit their eggs. It prevents them from reaching the soft bark at the surface of the ground, the place usually selected. It is stated in Downing's *Fruit and Fruit Trees*, that "the beetles may be destroyed in June by building small fires of shavings in different parts of the orchard."

The Apple-Worm—Codling-Moth.—The ravages of this insect on the apple are becoming quite alarming, and unless its destruction be pursued with prompt and persevering efforts, our apple-orchards will soon cease to be profitable. The moth appears in New England, New York, and other places similar in climate, about the middle of June; farther south earlier. It deposits its eggs in the eye or calyx of the young apple; in a few days they hatch, and the worm burrows into the core of the fruit. It can be traced by the brownish powder which it casts out behind it. In some three weeks it attains its full size, and escapes from the apple through a hole which it makes in the side, and takes shelter in the scales of the bark of the tree or such other suitable place as it can find. It has been supposed that they remain in their cocoons all winter, but from recent observations they complete their transformations in two or three weeks, and raise a second brood. Southward it is even supposed that they reach the *third* generation in one season.

Means of Destruction.—1st. Scrape and clean the bark of the trees thoroughly early in spring, and see that no

cocoons are left in the crevices. 2d. Examine all barrels, bins, shelves, etc., where apples have been stored in cellars or fruit-rooms. 3d. Place bandages of old cloth, carpet, or rags of any kind around the trunks and large branches of every tree, say by 1st of July, to trap the worms; examine every week or two, and kill all worms that have been trapped. 4th. Pick or knock off every wormy fruit before the worm escapes, and destroy; pick up all that drop, and destroy in the same way.

The Canker-Worm.—This insect is confined chiefly to New England; we have never seen it in New York.

They generally emerge from the ground in March. According to Professor Harris, some rise during the late autumn and winter months. The female has no wings, but crawls up the tree, and lays her eggs on the branches in May, in clusters of 60 to 100 in each, glued to each other and to the bark by a grayish varnish impervious to water; the little worms fall upon the leaves, and, when numerous, devour them all, leaving only the mid-ribs. They leave the trees when about four weeks old, and enter the ground. Their effects are most visible in June, when the trees, divested of their foliage, appear as if scorched by fire.

As the female cannot fly, the great point is to prevent her from crawling up; for this purpose various means have been tried and are recommended. One of the most effectual is to tie strips of canvas around the tree and cover them with tar, renewing the tar during their whole season of rising, or from October till May. Another is, to make a close-fitting collar of boards around the base of the tree, and keep the boards covered with tar. Mr. J. Dennis, of Portsmouth, R. I., patented a circular leaden trough filled with oil, which proves an effectual preventive.

Caterpillars.—Of these there are many kinds that are more or less destructive to the foliage of fruit trees; but the Caterpillar described by Professor Harris as the American Tent Caterpillar, is the one that commits such

general and extensive devastation in our orchards, and especially in certain seasons. The moth deposits its eggs in July, in large rings, on the branches of the trees; these remain in that state until the following season, when they are hatched in the latter end of May or beginning of June. Each ring produces three or four hundred caterpillars, and these weave a sort of web to live in. The appearance of a tree with three or four of these tents upon it, and the leaves completely devoured, is really frightful. There are two ways of destroying them: one is, to examine the trees carefully in February or March, at pruning time, and destroy the clusters of eggs by cutting off and burning the branches on which they are found. The next is to destroy the caterpillars in their tents after they are hatched. There are various ways of doing this, according to people's fancy and ingenuity. The quickest and most effectual method is to take a ladder, ascend the trees, and remove every nest with the hands. The early morning should be chosen, when they are in the nests. Some put a round brush on a pole and put it in the nests, and by giving it a few turns web and all are removed.

There is another caterpillar, *Datana ministra*, which is a yellow brown in color, and feeds in clusters side by side, fairly stripping branch after branch completely of its foliage. Watchfulness and immediate destruction on sight are the only known remedies. Their season of destructive labor is in August and September.

The Cherry and Pear Slug.—This is a most destructive insect. They appear in June and July for the first, and a second brood afterwards, small, slimy, dark-brown slugs on the upper surfaces of the leaves of the cherry and pear. They devour greedily the parenchyma of the leaves, leaving only the bare network of veins. In a short time growth is completely stopped.

Stocks for budding require careful watching, for a day or two of these slugs may prevent them from being worked.

that season. We destroy them by throwing fine earth taken up with the hand among the trees, and by ashes or slaked lime, when the earth is not sufficiently dry and fine. The caustic properties of lime and ashes render them more certainly destructive to the slug, and they should always be used in preference to common earth, where only a few trees are to be gone over.

A liberal syringing with the tobacco and soap liquid recommended for the aphid, but in a weaker state, is serviceable after the ashes and lime. It must be remembered that one application will seldom be sufficient. Some escape even to the third or fourth; but in all cases the warfare should be sustained whilst one remains. They are generally most troublesome in warm and dry seasons.

The Currant - Worm.—This is a small, light, yellow worm that eats the leaves of currants and gooseberries in June. The remedy is to dust the leaves with powdered white hellebore, as soon as it first appears, and repeat daily till the worm disappears. We have also used dry fresh-slaked lime successfully.

The Curculio or Plum - Weevil.—This is a small grayish-brown beetle, nearly a quarter of an inch long; the wing-covers form two little humps on the back, which give it a roundish appearance, and it has a long crooked snout, well adapted to its destructive propensities. They can fly, but are not active; and by jarring the part on which they stand, suddenly, they fall to the ground, draw in their legs, and appear dead. It deposits its egg in a semicircular incision which it makes in the young fruit; it there hatches, eats into the fruit, and causes it to fall while yet green. In some places it destroys the entire crop of plums, apricots, and nectarines, and attacks even the cherry and the apple. The peach, even, is not wholly exempt, notwithstanding its coat of down. Almost every remedy that ingenuity can devise has been tried. This whole book would not contain what has been written

on the subject in one year alone. Yet no complete, effectual remedy has been discovered. The strongest liquid applications of lime, soap, and tobacco, the most powerful and offensive odors that repel any other insects, are entirely harmless and inoffensive to the curculio. There seem to be really but two means worthy of being resorted to. One is, to pave, or in some other way harden, the surface of the ground, so that the grubs cannot enter it to complete their transformations. This is found efficient where no other trees are in the immediate vicinity not paved. We have seen many instances where good crops were obtained by this mode. The fact that they are, as a general thing, less troublesome in stiff clay soils than in light porous ones, is alone a proof of the efficacy of a stiff or impenetrable surface soil.

Add to this the picking up of fruit containing the grub as soon as it drops from the tree, and before the worm has a chance to escape.

To accomplish both these ends, some people have planted their plums and apricots in a small inclosure by themselves, adjoining the hog-pen, and as soon as the fruits begin to drop these animals are admitted, and gather all up, and at the same time tread the ground so firmly that it is almost as good as if it were paved.

This is probably the easiest and best way to insure a crop of the fruits attacked by this insect.

Another way is, to jar the tree daily, from the moment they begin to appear, which is when the fruit is the size of a pea, until they have disappeared, or the fruit begins to ripen, when it is no longer attacked. This is our own method, and is successful. The insects are easier jarred off in the cool of the morning, while they are torpid.

Before commencing to jar them down, a white sheet or cloth, wide enough to cover all the ground under the branches, should be spread to receive the insects as they fall, so that they may be destroyed. This was recom-

mended through the "Genesee Farmer," by David Thomas, forty years ago. At the West a machine or hand butting barrow has been introduced for jarring and catching the curculio in large orchards, but it is said to injure the trees by the severe blows consequently necessary with its use.

From repeated observations, I am inclined to believe that it is quite sensitive to cold, for it is well known that in the cool of the morning it is always in a comparative state of torpor; and in the cold seasons of 1849-50, when our peach trees and fruit were so greatly injured, the curculio was driven off, and we had a most abundant crop of plums. A cold day or two may not affect it; but when it continues for two weeks, as in the years referred to, it seems to be rendered powerless for that season.

Ants.—These are not very destructive, yet they sometimes do considerable injury to beds of seedlings, by making their hillocks among them, and they also infest ripe fruits.

Boiling water, oil, or spirits of turpentine, poured on their hillocks, disperses them; and if wide-mouthed bottles, half-filled with sweetened water or syrup, be hung among the branches of a tree when the fruit is attaining maturity, ants, wasps, flies, and beetles of all sorts that prey greedily upon sweets, will be attracted into them.

Mr. Downing, who recommends this as a "general extirpator suited to all situations," says that "an acquaintance caught in this way, in one season, *more than three bushels* of insects of various kinds, and preserved his garden almost entirely against them."

A gentleman in Detroit, who was very careful of his garden, informed me that he had pursued this method of trapping insects with results that perfectly astonished him. He had to empty the bottles every few days to make room for more. A very good way of trapping and killing ants is, to besmear the inside of flower-pots with molasses, and turn them on their mouths near the hillock;

the insects will soon assemble inside on the molasses, when they are easily destroyed by a handful of burning straw.

The Peach-Tree Borer.—This is a most destructive insect when allowed to increase for a few years without molestation. We have seen whole orchards of fine trees ruined by them. They sometimes attack even young trees in the nursery, and commit serious depredations on their collar, rendering them in many cases quite unfit for planting. Their multiplication should be prevented by all possible means. The eggs are deposited in summer on the base of the trunk, near the collar, where the bark is soft. There they are hatched, and bore their way under the bark of the tree, either in the stem or root, or both, producing an effusion of gum. Where trees are already affected, the proper course is, to remove the earth from around the collar of the root, clean away the gum, destroy any cocoons that may be found, trace the grub through its holes in the tree, and kill it; then fill up around the tree with fresh earth, and place a shovelful or two of ashes around the base. One of the best orchards in the vicinity of Rochester was at one time nearly ruined by the prevalence of this grub, when it changed proprietors, and the present one adopted and followed the plan recommended above, until there is not the trace of one left. The ashes or slaked lime should be applied every spring, and at the end of summer may be scattered about the tree; both ashes and lime form an excellent dressing for the peach.

The Rose-Bug.—The eggs of this insect are laid in the earth, where they are hatched, and from which the bug emerges about the rose season.

In some seasons and in some localities they appear like grasshoppers in vast multitudes, and commit extensive ravages, not only on the rose but fruit trees and all other green things. Syringing the plants with diluted whale-

oil soap is the only remedy aside from hand-picking, which is most effectual. One gallon of whale-oil soap to three gallons of water syringed over them, when on the tree, effectually destroys them. In some cases fruit trees have been protected by covering them with millinet.

Leaf-Rollers.—In May and June these insects may be found on the leaves of fruit trees, and especially on the pear; they form for themselves a sort of cocoon out of the leaf. The leaves attacked by them should be removed and destroyed, in order to prevent their increase. The eggs are deposited on the young leaves by some of the multitudes of spring beetles.

SECTION 3.—ANIMALS INJURIOUS TO FRUITS AND FRUIT TREES.

Birds.—As a general thing, birds are more the friends than the enemies of the garden. Many of them subsist in greater part on insects, and thus perform services that are by no means appreciated. The early cherries and grapes are generally the greatest sufferers by them, and various devices are practised to frighten them away, the most cruel of which is shooting, which must, however, in some cases be resorted to. Moving objects resembling the human figure, bits of looking-glass or tin suspended among the branches, etc., are often effectual. Dwarf trees are easily covered with thin netting supported on poles and fastened at the base of the tree.

Field Mice.—The most effectual preventive is clean culture. Leave no grass, weeds, rubbish, or heaps of stones around the garden or orchard, and the mice will seldom be troublesome. Their operations of girdling are principally carried on beneath the snow, and when this is firmly trodden down as soon as it falls, it obstructs their way. A correspondent of the "Horticulturist" states that he has found tin tubes fixed around the base of the tree, an effectual remedy; and M^r

Hooker, of Rochester, has successfully driven them off with poison. He takes a block of wood six inches long and three or four square, and bores it lengthwise with an inch-and-a-half auger nearly through, and places in the lower end some corn-meal and arsenic. He places these blocks among the trees, mouth inclined downwards, "to keep the powder dry."

Great destruction of orchards was committed by the mice in the winter of 1869-70, and since then various contrivances have been resorted to. One is to incase the lower part of the tree in a thin, flexible wooden covering. Corn and corn-meal mixed with poison and scattered around the trees has also been employed, with more or less success.

Moles.—These are easily poisoned and driven off, by putting pills of flour mixed with arsenic into their holes, and shutting them up. We have seen them banished by bits of dried codfish placed in the entrance of their holes.

Cats often commit serious depredations on trees by scratching the bark. Quite recently we saw a large number of beautiful fruit trees nearly ruined by them. A few briers secured around trees in the vicinity of the house, where they frequent most, will be a sufficient protection.

Hogs.—It is not generally supposed that these animals will attack trees; but we have heard of a Western farmer who turned in a large number of them to consume the corn that had been grown in his young orchard. When the corn began to grow scarce they attacked the trees, and not one out of several hundred but was completely girdled—the bark gnawed off as far up as the brutes could reach.

Where it may be desirable to turn hogs into an orchard, unless the feed be very abundant, the trees should be protected around the base with thorns, briers, or some prickly brush.

Rabbits may be deterred from causing injury by rub-

bing the body of the tree with fresh blood once in a week or so during winter, or by wrapping them a foot or two above the ground with thick, firm paper.

CHAPTER IV.

NURSERY, ORCHARD, AND FRUIT-GARDEN IMPLEMENTS.

THE following are the principal implements used in the propagation, pruning, and cultivation of fruit-trees :*

SECTION 1.—IMPLEMENTS OF THE SOIL.

The Subsoil Plow (see fig. 160) is the great reformer of the day in the preparation of soils of all qualities and

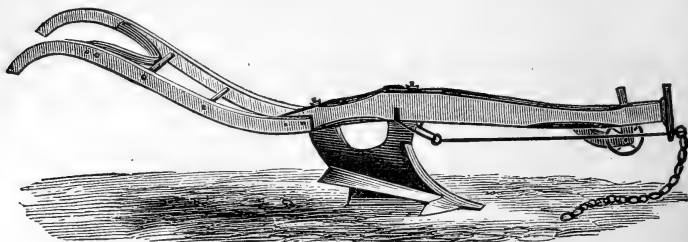


Fig. 160.—SUBSOIL PLOW.

textures, for nursery, orchard, or garden trees. It follows the ordinary plow in the same furrow ; and the largest size, No. 2, with a powerful team, can loosen the subsoil to the depth of eighteen inches. No. 1 will be sufficient in clear land when the subsoil is not very stiff.

The One-Horse Plow.—Similar to the common plow used by farmers. It is a labor-saving implement for cultivating the ground among nursery-trees or orchards

* A share of the engravings used in the illustration of this chapter are from the elaborate Implement Catalogue of R. H. Allen & Co., No. 189 and 191 Water street, New York City.

closely planted. The horse should be steady, the man careful, and the whiffle-tree as short as possible, that the trees need not be bruised. It should neither run so deep nor so near the trees as to injure the roots.

The Cultivator.—This, with the plow, obviates the

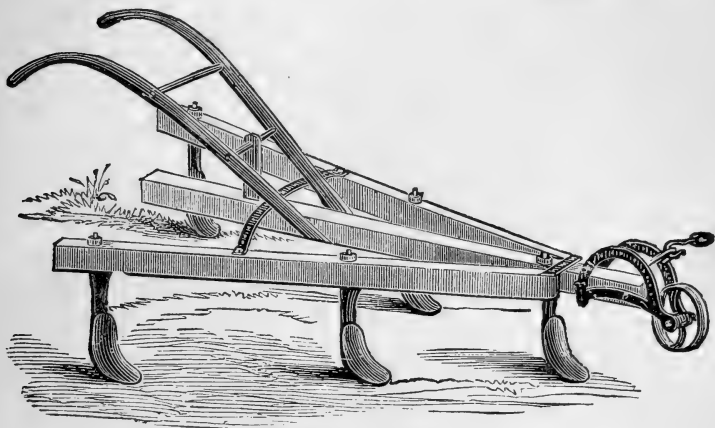


Fig. 161.—CULTIVATOR.

necessity of spade-work, and, in a great measure, hoeing. If the ground be plowed in the spring, and the cultivator passed over it once every week or two during the summer, all the hoeing necessary will be a narrow strip of a few inches on each side of the row. The double-pointed steel-toothed, with a wheel in front, as shown in fig. 161, is the best.

The Tree-Digging Plow.—This implement facilitates the work and entirely supersedes the spade in the labor of digging trees of the usual size in the nursery, where an entire plot is to be cleared. “It is constructed (see fig. 162) with two beams, one to run on each side of the row of trees, two sets of handles, and a peculiar share, much in shape like the letter U. This share is very sharp, the horizontal part runs under, and the vertical ones on each

side of the trees, and the roots are thus smoothly cut off, while the trees remain standing. The plow is of course propelled by horses and guided by two plowmen. It is an admirable implement for root-pruning young trees, especially evergreens, in place of the old practice of removing

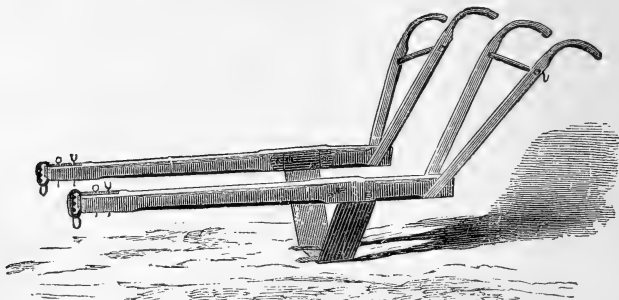


Fig. 162.—TREE-DIGGING PLOW.

them in order to cause them to throw out fibres and make balls suited to future removal.

The One-Horse Cart.—This is an indispensable machine in the nursery, orchard, or large garden. Four-wheeled wagons are difficult to unload, and require a great deal of space to turn in. The cart can be turned in a circle of twelve or fourteen feet, and the load discharged in a moment, simply by taking out the key that fastens the body to the shafts, throwing it up, and moving the horse forward. Our carts are about six feet long and three wide in the body, shafts six feet long, wheels four and a half feet high, and tire two and a half wide, to prevent them from sinking into the ground. The box is about a foot deep, and when large loads are to be carried a spreading board is put on the top with brackets. Cost from \$30 to \$50.

The Wheelbarrow (fig. 163).—Every man who has a rod of ground to cultivate should possess this machine. In small gardens it is sufficient for the conveyance of all manures, soils, products, etc., and in larger places it is al-

ways needed for use, where a cart cannot go. The handles or levers should be of ash or some tough wood, and the



Fig. 163.—WHEELBARROW

sides and bottom of any light wood. The wheel is soft wood, shod with iron.

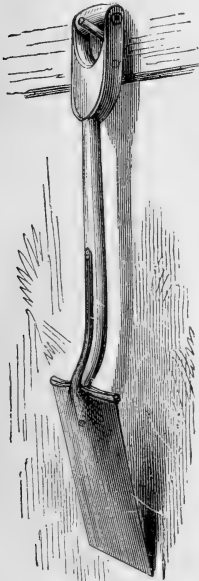


Fig. 164.—SPADE.

The Spade (fig. 164).—The best kinds of these in use are Ames' cast-steel; excellent, strong, light articles. They work clean and bright as silver. There are several sizes. For heavy work, trenching, draining, raising trees, etc., the largest should be used.

The Shovel (fig. 165).—This is used in mixing, loading, and spreading composts and short manures. The blade should be of cast-steel.

The Forked Spade (fig. 166).—This resembles a fork. It has three to five stout cast-steel tines, at least an inch wide, and pointed. It is used instead of a spade to loosen the earth about the roots of trees, to turn in manures, etc., being much less liable to cut and injure them than the spade.

The Dung-Fork (fig. 167).—There are several kinds. Those of cast-steel, cut out of a solid

plate, with three or four tines, are the best, light and durable; they are sometimes made with six tines. It is the only implement proper for loading, mixing, or spreading fresh rough manures with facility and dispatch.



Fig. 165.—SHOVEL.

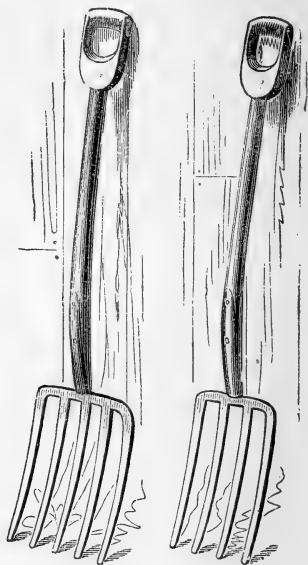


Fig. 166.—FORKED SPADES.

The Pick.—This is a useful, and even indispensable implement in the deepening or trenching of soils with a hard subsoil that cannot be operated upon with the spade. It consists of an ash handle, and a head composed of two levers of iron pointed with steel, and an eye in the centre for the handle.

The Garden-Line and Reel (fig. 168).—The line should be a good hemp cord, from one eighth to one fourth of an inch in diameter, attached to light iron stakes about eighteen inches long. On one of the stakes a reel is attached.

This is turned by means of a handle, and the line neatly and quickly wound up.

The Hoe.—This is a universal instrument in this country. In some cases, all the gardening operations are performed with it. Its uses in tree culture are to open trenches for seeds, to cover them, to loosen and clean the surface of the ground from weeds, etc. There are two kinds, the draw hoe (figs. 169, 170, 171) and the Dutch or thrust hoe (fig. 172); this we do not use at all. Of the different kinds and forms of the draw hoe, the most generally useful is the square, a cast-steel plate, about six inches long and four wide, with a



Fig. 167.—DUNG-FORKS.

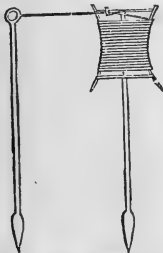


Fig. 168.—LINE AND REEL.

light, smooth handle. The semicircular and triangular hoes may be advantageously used in certain cases.

The Pointed Garden Hoe (fig. 173) is useful among borders and small plants.

The Rake (fig. 174) is used to level, smooth, pulverize, and clean the surface of the ground after it has been spaded or hoed, or to prepare it for seeds, etc. They are of different sizes, with from

six to twelve teeth. The best are those of which the head and teeth are drawn out of a solid bar of steel. Those that are welded and riveted soon get out of order.

SECTION 2.—IMPLEMENTS FOR CUTTING.

The Pruning Saw.—This is used for cutting off branches, either too large for the knife, or so situated that the knife cannot operate. It has various sizes and forms. Some are jointed, and fold like a pruning-knife; others are like the common carpenter's handsaw, but smaller and stouter. Two forms are shown at fig. 175.

The Bow-Saw (fig. 176).—This is the most generally useful form for the gardener or nurseryman. The blade is very narrow, and stiffened by an arch back. It is fastened at both ends by a rivet to the screw on which the back turns, and by which it is adapted to different purposes. It is indispensable in making horizontal cuts close to the ground, as in heading down.

Some are set with a double row of teeth on one side,



Fig. 169.—
SQUARE
DRAW-HOE.

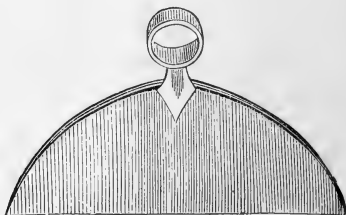


Fig. 170.—TRIANGULAR DRAW-HOE. Fig. 171.—SEMICIRCULAR DRAW-HOE.

and the edge is much thicker than the back; these work much easier than those toothed in the ordinary way, and it would be an object to have them where much saw-prun-

ing is to be done. Wherever the saw is used, the cut surface should be pared smooth with the knife, to facilitate its healing.

Long-handled pruning-saws are sometimes recommended, but never should be used in pruning fruit-trees, if possible to avoid it. The branch to be operated should be reached by means of a ladder, if need be, within arm's length, and cut with a common saw.

Hand Pruning-Shears (fig. 177).—

There is a kind of these made now, that, having a moving center, as in the figure, make a smooth *draw* cut almost equal to that of a knife, and it is a very expeditious instrument in the hand of a skilful workman. In pruning out small dead branches, shortening in peach-trees, etc., it will perform four times as much work as a knife.

Pruning Scissors (fig. 178).—These scissors cut as smoothly as a knife, and can be easily carried in the pocket, ready to take away a small branch wherever it may chance to be observed.

Lopping or Branch Shears.—These are very strongly



Fig. 172.—DUTCH OR THRUST-HOE.

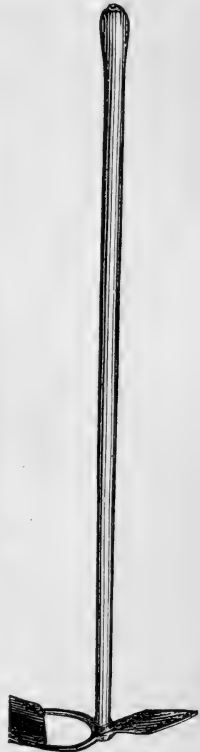


Fig. 173. — POINTED GARDEN-HOE.

made, with long wooden handles, and are used for cutting thick branches from trees, shrubbery, hedges, etc. One form is shown in fig. 179.

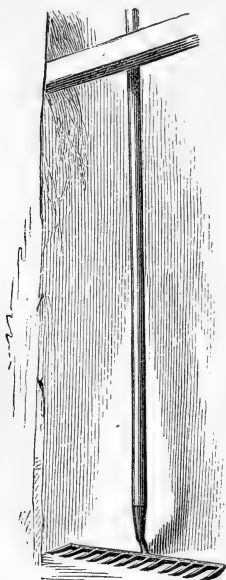


Fig. 174.—GARDEN RAKE.

Pole Pruning Shears.—These resemble the hand-shears, but are worked by a string passing over a pulley, and are fixed on a pole of any required length. They are used in cutting cions, diseased shoots, etc., from the heads of lofty standard trees.

Grape Scissors.—These are small, sharp-pointed scissors, as in fig. 180, for thinning bunches of grapes.

The Pruning-Knife.—The best for general purposes are those of medium size, with a handle about four inches long, smooth, slightly hollowed in the back; the blade about three and a half inches long, three quarters of an inch wide, and nearly straight (fig. 181). For very heavy work a larger

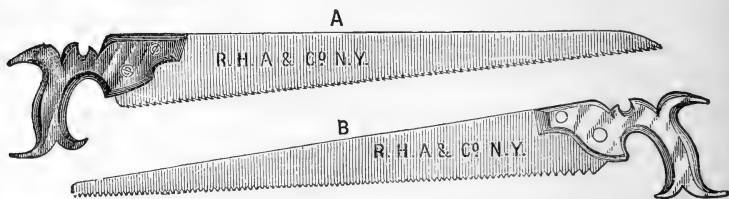


Fig. 175.—PRUNING-SAWS.

size may be necessary. "Saynor's" (English) knives of this kind are unsurpassed in material and finish.

The Budding-Knife.—This is much smaller than the

pruning-knife, with a thin, straight blade, the edge sometimes rounded at the point. The handle is of bone or

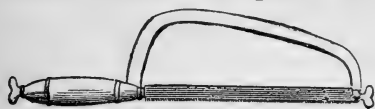


Fig. 176.—BOW-SAW.

ivory, and has a thin, wedge-shaped end for raising the bark. Bud-
ders have various fan-
cies about shape and

size; one form is given in figure 182.

The Grafting-Chisel.—This is used for splitting large

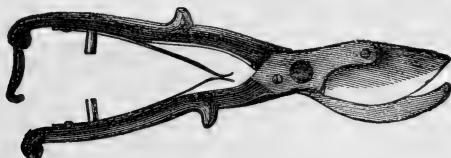


Fig. 177.—HAND PRUNING-SHEARS.

stocks; the blade is about two inches long, and an inch and a half wide, in the shape of a wedge; the edge curved so as to cut, and not tear the bark; the handle eight or ten



Fig. 178.—PRUNING-SCISSORS.

inches long, at the end of which is a narrow wedge to keep the split open until the cion is inserted. (See figure 183.) The whole is of steel.

Some are made with the blade in the middle, the wedge at one end, and a hook to hang it by on the other.

Mr. David S. Wagner, of Pulteney, N. Y., has invented an ingenious implement for

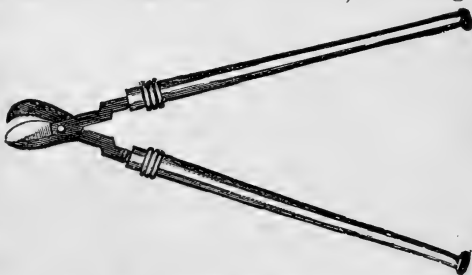


Fig. 179.—LOPPING OR BRANCH SHEARS.

grafting grapes; as it is patented, those who desire to know about it may inquire of the inventor.

Tree-Scraper (fig. 184).—This is made of heavy plate-steel, with a long, jointed handle for scraping upper branches, or a short one for the trunks.



Fig. 180.—GRAPE SCISSORS.

SECTION 3.—LADDERS AND FRUIT-GATHERERS.

Ladders.—Of these there are many kinds. For the fruit-garden, where the trees are low, the self-supporting ladder (fig. 185) is the most convenient and best. It should be made of light wood, with flat



Fig. 181. PRUNING-KNIFE.



Fig. 182.—BUDDING-KNIFE.

steps, so that a person can stand upon them and work. The back, or supports, consist of one or two light pieces of timber, fixed at the top with hooks and straps, so as to be contracted or extended at pleasure. A ladder of this kind, six or eight feet high, will answer all the demands of a garden.



Fig. 183.—GRAFTING CHISEL.

Orchard Ladders are of various kinds. For pruning or gathering the fruit from lofty trees, a great length of ladder is necessary; it is therefore desirable that the material be as light as possible consistent with the necessary strength. Sometimes these long ladders are composed



Fig. 184.—TREE-SCRAPER.

of several smaller ones, that fit into one another, all

mounted on a frame with a small wheel, by which they are easily moved about.

The Folding Ladder is a very neat and convenient article for many purposes. The inside of the styles is hollowed out, and the steps are fastened to them by means of iron pins, on which they turn as on hinges, so that the two sides can be brought together, the steps turning into the grooves or hollows in them, the whole appearing like a round pole—*B*. It is more easily carried and placed where wanted than the ordinary ladder. *A* represents it open, and *B* closed (fig. 186).



Fig. 185.—FRUIT-LADDER.

There are also *Self-supporting Orchard-Ladders*, composed of three upright pieces of any required length, and spread widely at the bottom, to give them stability. Two

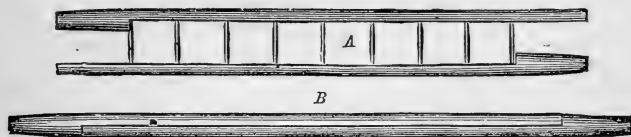


Fig. 186.—FOLDING LADDER.

of the sides are fixed, and are furnished with steps all the way up. The third is longer and movable, and can be extended or contracted at pleasure.

A piece of board wide enough to stand upon can be extended from one side to the other, resting upon the steps at whatever height it is desirable to work. On the movable side a pulley is fixed, by which the baskets of fruit are let down as they are gathered. Two persons or

more can ascend and work on a ladder at the same time. Fig. 187 represents one of these; *a*, *b*, the two fixed sides; *C*, the movable one. It is considerably used in France.

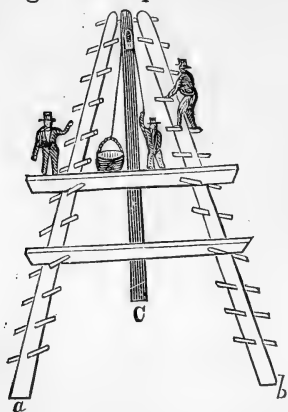


Fig. 187.—SELF-SUPPORTING ORCHARD LADDER.

The Orchardist's Hook is a light rod, with a hook on one end, and a movable piece of wood that slides along it.

The person gathering fruit draws the branch towards him with the hooked end, and retains it there by means of the sliding piece which is hooked to another branch. This is an indispensable instrument in gathering fruit from large trees.

Fruit-Gatherers.—Of these there are many designs by which the fruit may be taken

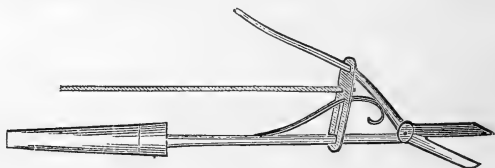


Fig. 188.—GRAPE-GATHERER.

from the tree by a person standing on the ground. They



Fig. 189.—HAND SYRINGE.

answer very well for gathering a few ripe specimens for

immediate consumption. The *ladder*, *hook*, and *hand* are the only safe and expeditious fruit-gatherers. Some are made in the form of a vase of wood or tin placed on the end of a pole. The edge of the vase is toothed, and when the stem of the fruit is taken between two of the teeth, and slightly twisted, it drops. Others are composed of a pair of shears on the end of a pole, to which a basket is attached that slides up and down the handle.

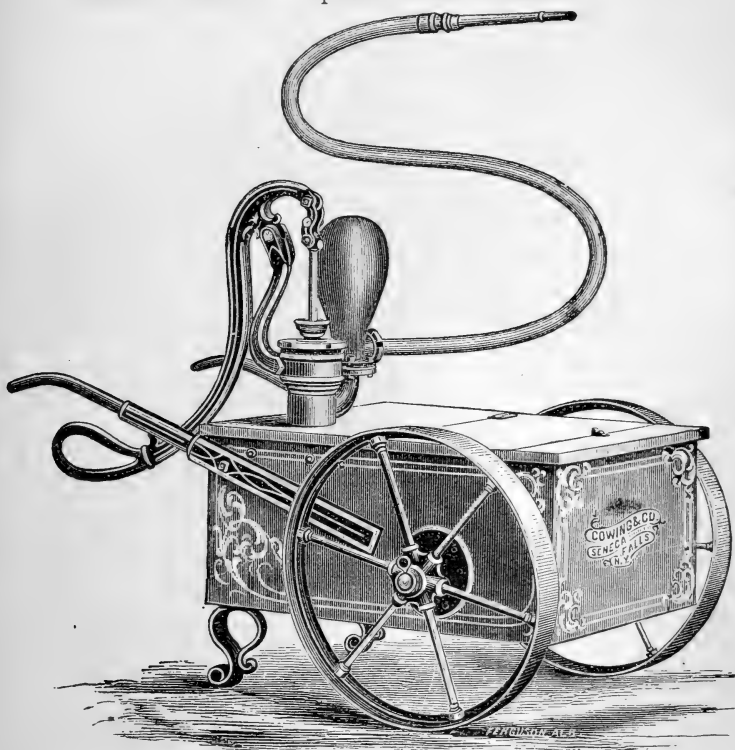


Fig. 190.—BARROW-ENGINE.

The Grape-Gatherer resembles a pair of shears combining the property of pincers. They cut a bunch of

grapes, and hold it firmly until it is brought down. These are very useful for gathering a few bunches of grapes from the top of a house or trellis (fig. 188).

SECTION 4.—MACHINES FOR WATERING.

The Hand-Syringe (fig. 189).—This is a very useful implement for sprinkling and washing the foliage of trees in dry weather. There are various kinds, made of tin, copper, and brass, and sold at various prices. Whatever sort is used should have several caps (*A*) to regulate the quantity or shower of water discharged; and they should also have an inverted or “gooseneck” one (*B*) to throw the stream, if necessary, on the under side of leaves, or in any oblique direction.

There are, also, *hand-engines*, *barrel-engines*, and *barrow-engines*, all of which are very useful. In every large garden there should be both the syringe and one of these engines; for watering is a most important affair in gardening under our hot sun and protracted drouths.

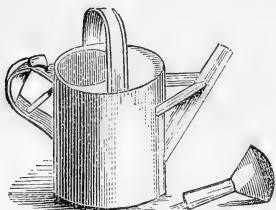


Fig. 191.—WATERING-POT.

The Barrow-Engine (fig. 190) is the most useful for general purposes; it is easily moved from one place to another. The improved kinds are easily worked, and the water-box, being provided with a strainer, excludes anything likely to derange its operations.

The Garden Watering-pot (fig. 191).—This is a tin or copper vessel that may hold from one to four gallons of water, with a spout six or eight inches long, by which the water is discharged. There should be a rose or roses, as in cut, to fit on the spout, pierced with *large* or *small* holes, by which the water can be discharged in a shower. Every pot may have several roses, pierced with holes of various sizes, to adapt them to different purposes.

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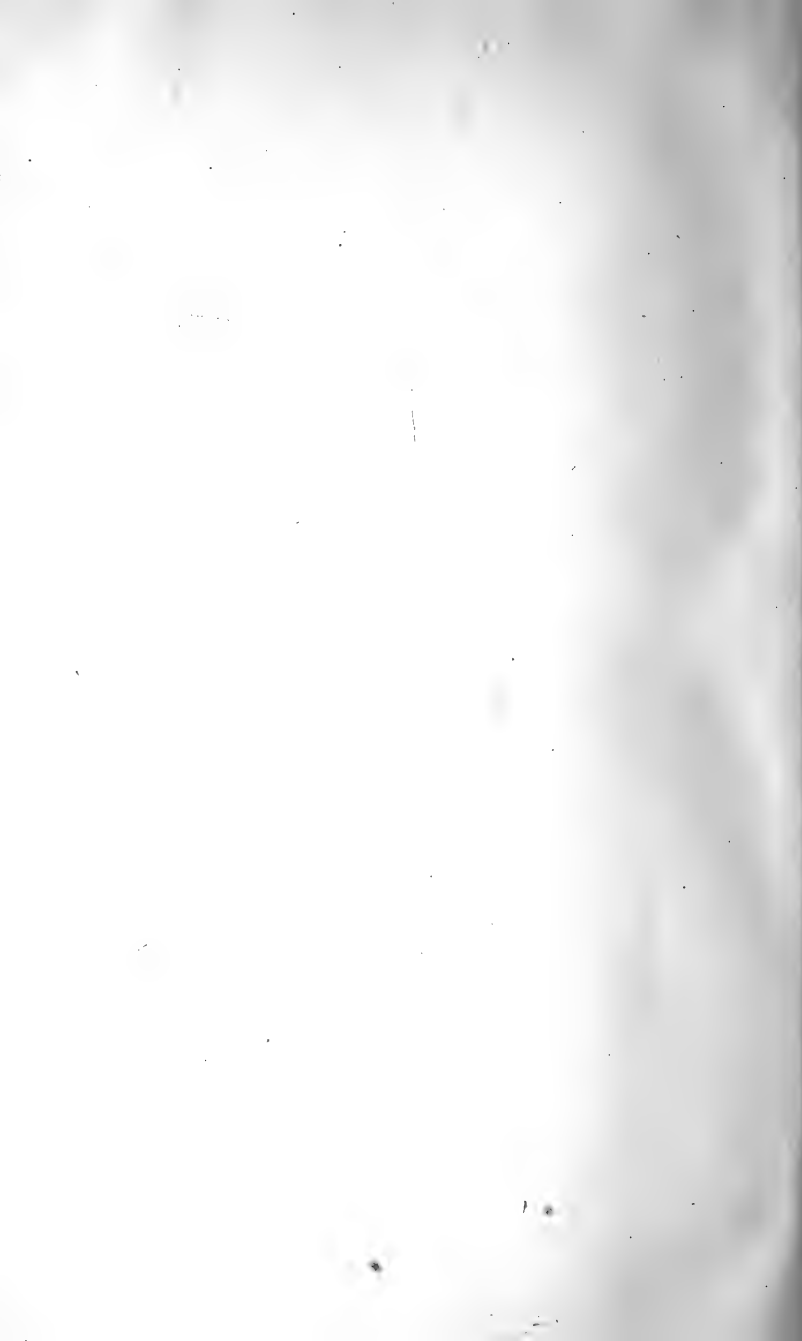
1. The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that proper record-keeping is essential for the transparency and accountability of the organization. This section also outlines the various methods used to collect and analyze data, ensuring that the information is reliable and up-to-date.

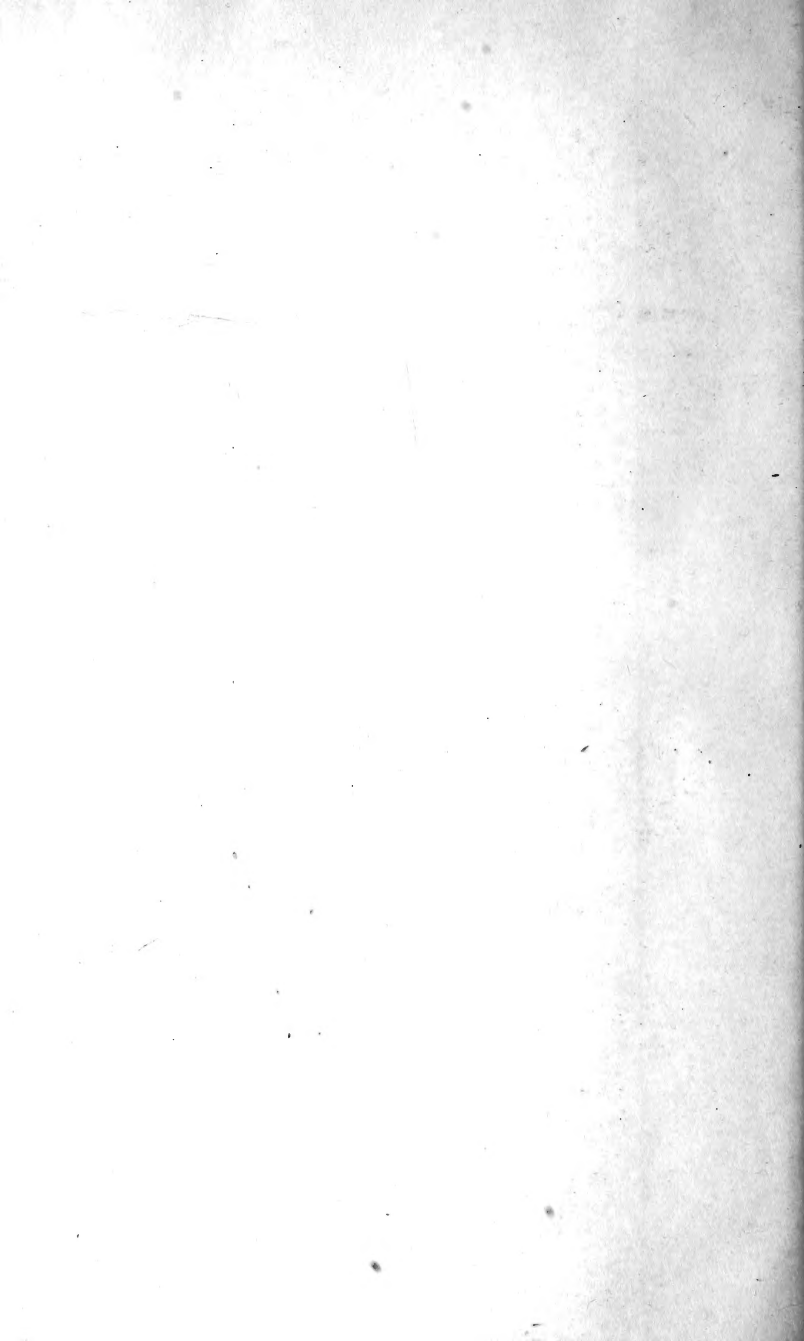
2. The second part of the document focuses on the implementation of these practices across different departments. It provides a detailed overview of the roles and responsibilities of each team, as well as the specific steps required to ensure compliance with the established protocols. This section also includes a timeline for the implementation of these measures, allowing for a clear understanding of the progress and any potential challenges.

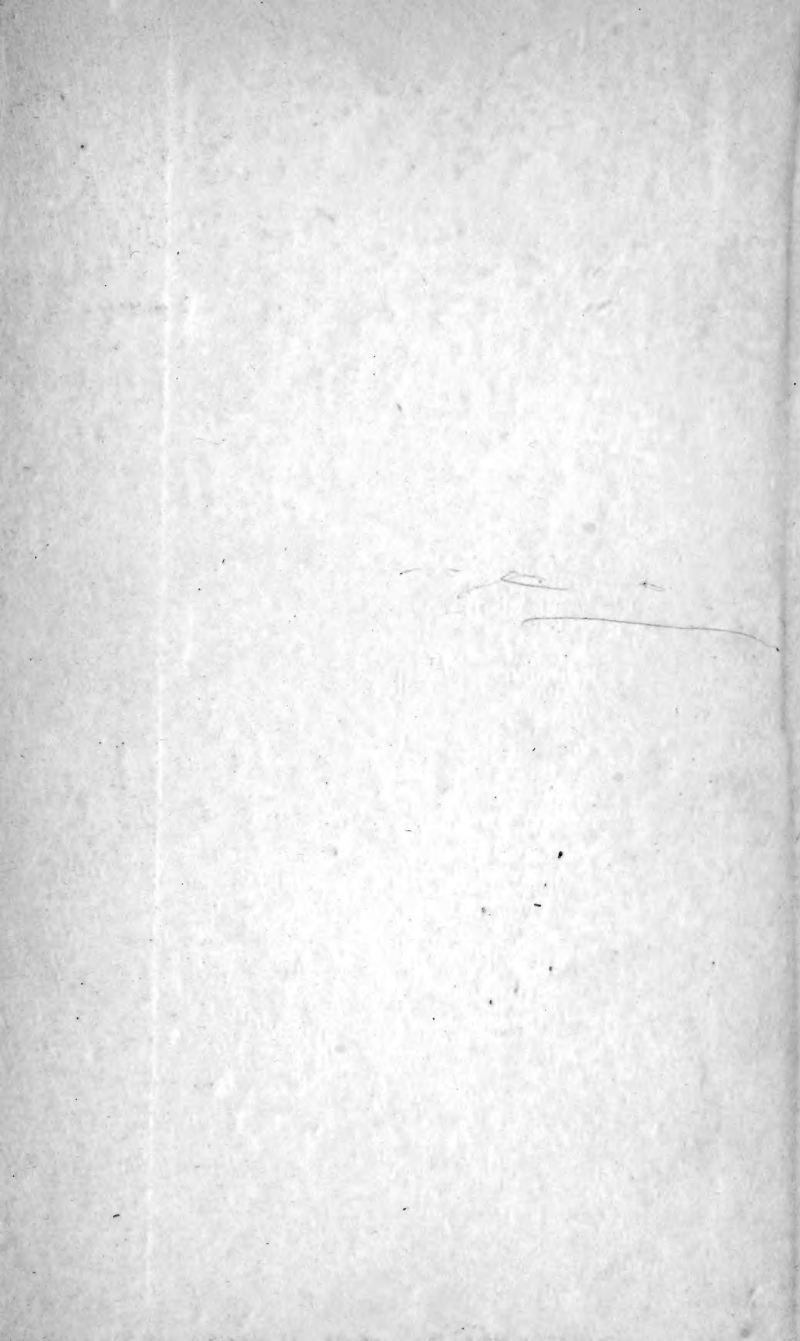
3. The third part of the document addresses the ongoing monitoring and evaluation of the implemented measures. It describes the various tools and techniques used to track performance and identify areas for improvement. This section also includes a discussion on the importance of regular communication and collaboration between all stakeholders to ensure the continued success of the initiative.

4. The final part of the document provides a summary of the key findings and conclusions. It highlights the significant improvements in transparency and accountability achieved through the implementation of the proposed measures. This section also includes a list of recommendations for future work, ensuring that the organization remains committed to the highest standards of integrity and ethical conduct.









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